

SCANNED

BOSTON GAS COMPANY  
SCREENING PROGRAM NOTEBOOK UPDATE

by

Haley & Aldrich, Inc.  
Cambridge, Massachusetts

for

Boston Gas Company  
Boston, Massachusetts

Steve Johnson  
BWSC/NERO  
has both 1/91 +  
12/91 reports

December 1991

GA

## II. Further Review Evaluations<sup>2</sup>

### A. Boston--Allston (Cambridge Street)

The Boston--Allston location was placed in the Secondary Study Group and designated for further review in January, 1991. The further review process confirmed that approximately half of the property is covered by buildings or pavement and further established that fencing prevents public access to the one small MGP building which remains at this location. During a revisit of this location by Haley & Aldrich in August 1991, no blue-stained rocks were visible at the edge of the fenced chemical company property, but new grass had recently been seeded in this area. No foreseeable change in use or development is expected.

Further review revealed that there has been extensive development and industrial usage of the former MGP property and adjoining parcels since gas production ceased in 1928. Various oil companies and a chemical company have used the location, and a hotel, a chemical company, and a tandem trailer lot are the current occupants. The portion of the property at 400 Soldiers Field road where the hotel is located is on DEP's reserve list under Chapter 21E (February 14, 1991 reserve list No. 3-1119). To the extent that there may be any current health or environmental risk related to oil or hazardous materials at this location, such risk would likely be attributable to intervening and adjacent uses and activities during the past 63 plus years.

In summary, large portions of the former MGP location have undergone substantial and intrusive development. There is no public access to the remaining former MGP building, and there is no visible evidence of surficial MGP contamination. No foreseeable change in use or development is expected. Given the absence of apparent risk associated with historic MGP activities at this location and the many other intervening and adjacent industrial uses of this location, Boston Gas Company will not be undertaking any MCP activities at this location.

### B. Boston--Dorchester (Calf Pasture)

The Calf Pasture location was placed in the Secondary Study Group and designated for further review in January, 1991. The filled-in and landscaped former MGP location currently is

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<sup>2</sup> The information reflected in these evaluations is based on available public information and records. No representation is made as to the accuracy or completeness of the information or that Boston Gas Company ever owned or operated the locations being evaluated.

occupied by the University of Massachusetts campus buildings and facilities. There are no visible former MGP structures nor surficial MGP contamination.

The further review process revealed that the property was used as a wrecking and dump site since gas manufacturing ceased around 1929 and recently has been extensively developed, excavated, and filled. Historic uses of adjacent property were also industrial and waste-intensive. To the extent that there may be any current health or environmental risk related to oil or hazardous materials at this location, such risk would likely be attributable to intervening and adjacent uses and activities during the past 62 plus years.

No change in foreseeable use or further development is expected, and there is no apparent surface MGP contamination. Given this absence of apparent risk associated with historic MGP activities at this location and the intervening and adjacent industrial and waste-intensive uses, Boston Gas will not be undertaking any MCP activities at this location.

C. Boston--Dorchester (Freeport Street)

The Freeport Street location was placed in the Secondary Study Group and designated for further review in January, 1991. This location was revisited by Haley & Aldrich during August, 1991; no blue-stained rocks were visible at the boat landing ramp at Malibu Beach, contrary to an initial report. However, gravel had been placed at the foot of the boat ramp since our June 1990 visit. Approximately a third of the former MGP property is paved or built over, and no original MGP structures remain, although portions of MGP building foundations are present. The portions of the property where MGP structures were located are heavily industrialized and inaccessible to the public. No MGP structures were formerly located on accessible undeveloped parts of the property, nor is there any visual evidence of surficial MGP residuals.

The further review process also revealed that since the time MGP operations ceased, sometime between 1903 and 1905, diverse industrial activities, including valve and dish manufacturing, metal stamping, cutting and dies, used automotive junkyards, a lumber yard, and an industrial laundry, have occupied portions of the former MGP location. To the extent that there may be any current health or environmental risk related to oil or hazardous materials at this location, such risk would likely be attributable to intervening uses and activities during the past 85 plus years.

BOSTON GAS COMPANY SCREENING PROGRAM  
FORMER MANUFACTURED GAS PLANT (MGP) LOCATION

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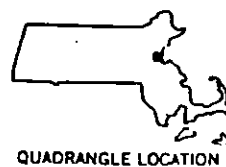
Location: BOSTON -- DORCHESTER (Calf Pasture)

Limited information indicates that gas may have been manufactured at this location between 1888 and approximately 1929. City files indicate that an application was filed with the Dorchester Building Department to demolish the MGP buildings in 1930. Subsequently, an office building was constructed. During the late 1950's the property was occupied by a wrecking company. Until 1962, city records indicate that the City of Boston Department of Public Works operated the "Mile Road" municipal dump site at this location. During the 1980's, while the University of Massachusetts was being constructed at this location, the Commonwealth excavated and disposed of portions of the former dump site and conducted extensive filling operations on the former MGP location.

Historic uses of property adjacent to the former MGP property included asphalt and fuel oil storage, industrial laundry operations, a garbage reduction plant, a vehicle wrecking and dismantling operation (City of Boston DPW), and a sewer pumping station.

The filled-in former MGP location currently is occupied by the University of Massachusetts campus buildings and facilities. Most of the former MGP location is landscaped. The campus is bordered by a library, Morrissey Boulevard and Dorchester Bay. There are no visible former MGP structures or MGP residuals.

The information reflected in this narrative and location map is based on available public information and records. No representation is made as to the accuracy or completeness of the information or that Boston Gas Company ever owned or operated the referenced location.



BOSTON GAS COMPANY  
SCREENING PROGRAM NOTEBOOK

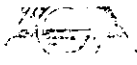
by

Haley & Aldrich, Inc.  
Cambridge, Massachusetts.

for

Boston Gas Company  
Boston, Massachusetts

January 1991



## **BOSTON GAS SCREENING PROGRAM**

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### **Secondary Study Group**

Arlington (Grove Street)  
Boston (Allston)  
Boston (Dorchester - Calf Pasture)  
Boston (Dorchester - Freeport Street)  
Boston (East)  
Boston (Jamaica Plain)  
Boston (Roxbury)  
Boston (South)  
Braintree  
Brookline  
Charlestown  
Chelsea  
Danversport  
Everett  
Gloucester  
Leominster  
Lexington  
Norwood  
Quincy  
Revere  
Stoneham  
Watertown  
Webster

# BOSTON GAS COMPANY SCREENING PROGRAM FORMER MANUFACTURED GAS PLANT (MGP) PROPERTIES

## Initial Study Group

### MCP Activity 1991-1992

Beverly  
Boston (Commercial Point)  
Clinton  
Lynn  
Malden  
Salem (Pierce)  
Southbridge  
Spencer

### Further Review

Boston (No. End)  
Waltham

### No Further BG Activity

Arlington (Mystic)  
Marblehead  
Salem (Northey)  
Woburn

## Secondary Study Group

### MCP Activity

Arlington (Grove St.)  
Braintree  
Everett  
Leominster  
Revere  
Webster

### Further Review

Boston (Allston)  
Boston (Dorchester -  
Calf Pasture)  
Boston (Dorchester -  
Freeport St.)  
Boston (Jamaica Plain)  
Boston (Roxbury)  
Brookline  
Charlestown  
Chelsea  
Norwood  
Quincy  
Stoneham  
Watertown

### No Further BG Activity

Boston (East)  
Boston (South)  
Danversport  
Gloucester  
Lexington



January 1991

page 1 of 2

BOSTON GAS COMPANY SCREENING PROGRAM

FORMER MANUFACTURED GAS PLANT (MGP) LOCATION

Location: BOSTON (Dorchester - Calf Pasture)

Bay State Gas Company began to produce gas at this location in 1888. Gas production ceased in approximately 1929. The former manufactured gas plant (MGP) location is currently occupied by state university campus buildings and facilities. Most of the former MGP location is landscaped. The campus is bordered by a library, Morrissey Boulevard and Dorchester Bay. There are no visible former MGP structures or MGP residuals.

1888-1929

The information reflected in this narrative and the attached location map(s) is based on available public information and records about historic manufactured gas production operations. No representation is made as to the accuracy or completeness of the information or that Boston Gas Company ever owned or operated the referenced location.



# **FORMER BOSTON (DORCHESTER-CALF PASTURE) MGP LOCATION**

**BOSTON SOUTH, MASSACHUSETTS  
7.5 X 15 MINUTE SERIES (TOPOGRAPHIC)**



QUADRANGLE LOCATION

*Boston / Dorchester  
151 Mt. Vernon St.  
J.K.K.*

March 17, 1989

Ms. Iris W. Davis  
Massachusetts Department of  
Environmental Quality Engineering  
Metropolitan Boston - Northeast Region  
5 Commonwealth Avenue  
Woburn, Massachusetts 01801

SUBJECT: DEQE Case No. 3-364  
MBTA Contact No. S3CN07 - Demolition, JFK/UMass Station  
Supplemental Information to Summary Report and Request for Delisting

Dear Ms. Davis:

In accordance with your discussions with Mr. George Smith of the MBTA and myself on March 13, 1989, we are forwarding to you at your request the following additional information as a supplement to the MBTA's February 27, 1989 summary report of remediation activities at the subject site.

- o Site boring logs for post-remediation monitoring wells
- o Tabulation of groundwater elevation measurements
- o Laboratory analytical data and chain of custody forms

These items are provided in support of the MBTA's request for favorable DEQE action in classifying remediation at this site as completed.

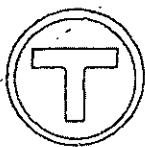
If you have any question on the above, or require additional information, please do not hesitate to contact Mr. Smith or myself.

Very truly yours,

SVERDRUP CORPORATION  
*Anthony J. Tawa, Jr.*  
Anthony J. Tawa, Jr.

Enclosures

cc: Mr. George H. Smith, MBTA



**MASSACHUSETTS  
BAY  
TRANSPORTATION  
AUTHORITY**

Regional Construction Office  
Cabot Yard  
275 Dorchester Avenue  
South Boston, MA 02127

November 5, 1987

Department of Environmental  
Quality Engineering  
5 Commonwealth Street  
Woburn, Massachusetts 02180

ATTENTION: Emergency Response Team

RE: M.B.T.A. Contract No. S3CN07, Demolition -  
JFK/UMass Station  
Potential Subsurface Oil Contamination

Gentlemen:

Remediation of the JFK/UMass Station demolition site (formerly Harry Butter property) for lead contamination is currently approaching completion. This past week the Contractor, O'Rourke Construction Co., completed excavations at the deepest portion of the contour, representing a depth approaching ten feet below the former grade. At this deepest excavation level only, the soil brought to the surface exhibited signs of contamination by a petroleum-based product. As the lower portions of this excavation are below the water table, the water that quickly flowed into the excavation exhibits a petroleum sheen.

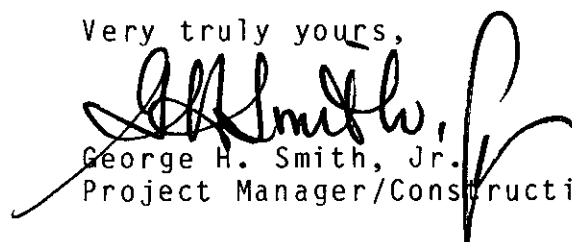
A soil sample from the bottom of this excavation was submitted to a certified analytical laboratory. The results of a hydrocarbon scan of this material became available on November 3 and indicate that the source of the contamination is almost certainly No. 2 fuel oil. The total hydrocarbon concentration of this sample was 3,890 mg/kg. However, the source of this petroleum-based contamination is unknown. The three underground tanks that formerly existed at this site contained lighter petroleum products (i.e., diesel and gasoline), and together with the soil beneath them were examined by the Engineer for leakage upon removal by the Contractor. The tanks were intact and no evidence of leakage was present.

- 2 -

In accordance with the requirements of Massachusetts General Law Chapter 21E, Section 7, the Massachusetts Bay Transportation Authority is hereby notifying the Department of Environmental Quality Engineering that the Authority as of this date has knowledge of a release of oil. The source of this oil is unknown, but is presumed to be migrating onto the JFK/UMass Station demolition site from off-site.

If you have any questions on the above, do not hesitate to contact me.

Very truly yours,

  
George H. Smith, Jr.  
Project Manager/Construction

GHS/cmd

722-5450  
722-5593

GOLDBERG-ZOINO & ASSOCIATES, INC.  
320 NEEDHAM ST., NEWTON UPPER FALLS, MA  
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT

JFK/UMASS MBTA STATION  
DORCHESTER, MA

REPORT OF BORING No. PMW-1  
SHEET 1 OF 1  
FILE No. G-3876.3  
CHKD. BY

BORING Co.  
FOREMAN  
GZA ENGINEER

GZA DRILLING, INC.  
C. CENLING  
C. PHILLIPS/TF

BORING LOCATION SEE EXPLORATION LOCATION PLAN  
GROUND SURFACE ELEVATION DATUM  
DATE START 5/14/88 DATE END 5/14/88

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

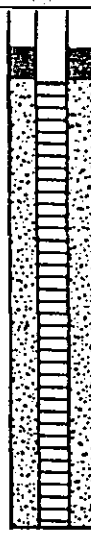
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.

CASING SIZE: 3-3/4" HSA

OTHER:

GROUNDWATER READINGS

DATE	TIME	DEPTH	CASING	STABILIZATION TIME
5/14/88	1410	11.1	WELL	3 HOURS
6/8/88	1300	10.84	WELL	25 DAYS
	(FROM TOP	OF	PVC)	

DEPTH H.	C B L O W S	SAMPLE				SAMPLE DESCRIPTION  Burmister CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	RE M A R K S	
		No.	PEN./ REC.	DEPTH (Ft.)	BLOWS/6"						
5		S-1	24/18	0-2	8-10	Dense, orange-brown, fine to medium SAND, little Gravel, trace(+) Silt (FILL)	FILL		Protective Steel Casing		
				20-40							
10		S-2	24/16	5-7	19-10	Medium dense, black, fine to medium SAND, little(-) Gravel, little(-) Cinders, trace(+) Silt, trace Brick (FILL)	10.0' PEAT		Bentonite Seal 1'-2'	Riser 0'-2'	Sand 2'-15'
				10-10							
15		S-3	24/24	10-12	WOH-1	Very loose, brown, fibrous PEAT	15.0' FINE SAND		Filter 2'-15'	2" PVC Screen 2'-15'	
				1-1							
20		S-4	24/20	15-17	19-16	Medium dense, grey-green, fine SAND, trace(+) Silt (occasional 1/2" layers fine to medium SAND)  Bottom of boring at 17'					
25											
30											
35											
40											

REMARKS: 1. Weight of hammer (WOH) drove spoon 6".

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.  
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING No. PMW-1

GOLDBERG-ZOINO & ASSOCIATES, INC.  
320 NEEDHAM ST., NEWTON UPPER FALLS, MA  
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT

JFK/UMASS MBTA STATION  
DORCHESTER, MA

REPORT OF BORING No. PMW-2  
SHEET 1 OF 1  
FILE No. G-3876.3  
CHKD. BY

BORING Co. GZA DRILLING, INC.  
FOREMAN C. LENCING  
GZA ENGINEER C. PHILLIPS/LP

BORING LOCATION SEE EXPLORATION LOCATION PLAN  
GROUND SURFACE ELEVATION DATUM  
DATE START 5/14/88 DATE END 5/14/88

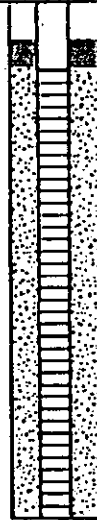
SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT  
SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb.  
HAMMER FALLING 24 in.

CASING SIZE: 3-3/4" HSA OTHER:

GROUNDWATER READINGS

DATE	TIME	DEPTH	CASING	STABILIZATION TIME
5/14/88	1415	10.6	WELL	6 HOURS
6/8/88	1300	10.3	WELL	25 DAYS
	(FROM	TOP	OF	PVC)

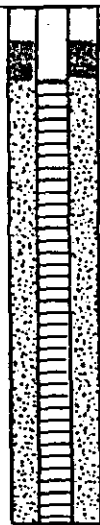
DEPTH	C A S I N G S	SAMPLE				SAMPLE DESCRIPTION  Burmister CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS						
		No.	PEN./ REC.	DEPTH (Ft.)	BLOWS/6"											
5		S-1	24/8	0-2	24-30	S-1: Very dense, black, fine to medium SAND, little Silt, trace(+) Gravel (FILL) S-1A: Light brown, fine to medium SAND, little(+) Gravel, trace(+) Silt (FILL)	FILL									
					24-20											
10		S-2	24/14	5-7	26-20	Dense, light brown, fine to medium SAND, little(-) Gravel, trace(+) Silt (FILL)	10.0' PEAT									
					18-18											
15		S-3	24/18	10-12	1-1	Very loose, brown, fibrous PEAT	15.0' SILTY SAND 15.5' SILTY CLAY									
					1-1											
20		S-4	24/14	15-17	12-13	S-4: Medium dense, grey, fine SAND little(+) Silt S-4A: Yellow-brown, Silty CLAY										
		S-4A	/4		12-13											
25						Bottom of boring at 17.0'										
30																
35																
40																

REMARKS:

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.  
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING No. PMW-2

GOLDBERG-ZOINO & ASSOCIATES, INC. 320 NEEDHAM ST., NEWTON UPPER FALLS, MA GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANT				PROJECT JFK/UMASS MBTA STATION DORCHESTER, MA		REPORT OF BORING No. PMW-3 SHEET 1 OF 1 FILE No. G-3876.3 CHKD. BY				
BORING Co. GZA DRILLING, INC. FOREMAN C. LENLING GZA ENGINEER C. PHILLIPS/IT		BORING LOCATION SEE EXPLORATION LOCATION PLAN GROUND SURFACE ELEVATION DATUM DATE START 5/14/88 DATE END 5/14/88								
SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 LB. HAMMER FALLING 30 IN. CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 LB. HAMMER FALLING 24 IN. CASING SIZE: 3-3/4" HSA OTHER:					GROUNDWATER READINGS					
					DATE	TIME	DEPTH	CASING	STABILIZATION TIME	
					5/14/88	1400	8.7	WELL	1 HOUR	
					6/8/88	1300	8.05	WELL	25 DAYS	
						(FROM	TOP	OF	PVC)	
DEPTH	C B A L L O W S	SAMPLE			SAMPLE DESCRIPTION  Burmister CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	RE M A R K S	
		No.	PEN./ REC.	DEPTH (Ft.)						BLOWS/6"
5		S-1	24/14	0-2	1-2	FILL				
				2-1	S-2: Very loose, grey, fine to medium SAND, little(-) Gravel, trace(+) Silt (FILL) S-2A: Grey, fibrous PEAT					7.0' PEAT
10		S-3	24/24	10-12	1-2	Loose, brown, fibrous PEAT				
				2-3						
15		S-4	24/12	15-17	5-6	S-4: Stiff, blue-grey, Silty CLAY, S-4A: Grey, fine SAND, some Silt	15.0' SILTY CLAY 16.0' SILTY SAND			
		S-4A	/6		12-11					
20					Bottom of boring at 17.0'					
25										
30										
35										
40										
REMARKS:										
NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE										
GZA								BORING No. PMW-3		



GOLDBERG-ZOINO & ASSOCIATES, INC.  
320 NEEDHAM ST., NEWTON UPPER FALLS, MA  
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT

JFK/UMASS MBTA STAT  
DORCHESTER, MA

REPORT OF BORING No. PMW-4  
SHEET 1 OF 1  
FILE No. G-3876.3  
CHKD. BY

BORING Co. GZA DRILLING, INC.  
FOREMAN C. LENLING  
GZA ENGINEER C. PHILLIPS/LP

BORING LOCATION SEE EXPLORATION LOCATION PLAN  
GROUND SURFACE ELEVATION DATUM  
DATE START 5/14/88 DATE END 5/14/88

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT  
SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

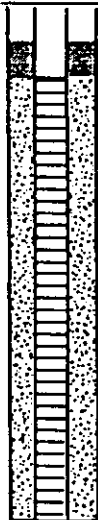
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb.  
HAMMER FALLING 24 in.

CASING SIZE: 3-3/4" HSA

OTHER:

GROUNDWATER READINGS

DATE	TIME	DEPTH	CASING	STABILIZATION TIME
5/14/88	1415	11.0	WELL	5 HOURS
6/8/88	1300	10.26	WELL	25 DAYS
(FROM TOP		OF	PVC)	

DEPTH	C A S I N G S	SAMPLE				SAMPLE DESCRIPTION  <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS	
		No.	PEN./ REC.	DEPTH (Ft.)	BLOWS/6"						
5		S-1	24/14	0-2	4-5	Medium dense, black, fine to medium SAND, little(-) Gravel, trace(+) Silt (FILL)	FILL			1.	
				7-7							
10		S-2	24/14	5-7	14-19	Dense, light brown, fine to medium SAND, little(-) Gravel, trace(+) Silt (FILL)	FILL				2.
				26-37							
15		S-3	24/20	10-12	1-1	Very loose, brown, fibrous PEAT	10.0' PEAT				
				1-1							
20		S-4	24/18	15-17	6-6	Medium dense, grey, fine SAND, little Silt	15.0' SILTY FINE SAND				
				12-16							
25						Bottom of boring at 17.0'					
30											
35											
40											

REMARKS:

- Bottom 4" of sample contained little (-) cinders.
- Petroleum saturated soils spun up at depth of approximately 12' - 14'.

NOTES:

- STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
- WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING No. PMW-4

TABULATION OF GROUNDWATER ELEVATION MEASUREMENTS

<u>Date</u>	<u>MW - 1</u>	<u>MW - 2</u>	<u>MW - 3</u>	<u>MW - 4</u>
7/07/88	107.60 (3)	NA*	108.67 (1)	108.55 (2)
7/11/88	107.49 (3)	107.33 (4)	108.58 (1)	108.45 (2)
7/21/88	108.04 (3)	107.69 (4)	109.73 (1)	108.88 (2)
7/21/88	107.65 (3)	107.55 (4)	109.51 (1)	108.61 (2)
7/28/88	109.18 (4)	111.74 (2)	112.67 (1)	110.43 (3)
8/03/88	108.88 (4)	110.84 (2)	111.13 (1)	110.12 (3)
8/10/88	108.59 (4)	110.00 (2)	110.21 (1)	109.61 (3)

\*Lockable protective cover could not be removed during 7/7/88 visit to site  
 \*\*Duplicate measurement using alternate (plumb) measuring method

- NOTES: 1. All measurements were made between 8 a.m. and 9 a.m. on the dates shown. Relative ranking (highest to lowest) for each date shown in parentheses.
2. Coordinates and elevations of top of PVC pipe associated with each monitoring well are as follows:

<u>Mon. Well</u>	<u>Elev.</u>	<u>North</u>	<u>East</u>
MW-1	119.22	481,607.1	721,151.3
MW-2	118.35	481,520.2	721,008.4
MW-3	117.67	481,728.5	720,980.1
MW-4	119.42	481,563.6	721,067.4



June 22, 1988

Mr. Anthony Tawa  
Sverdrup Corporation  
38 Chauncy Street  
Boston, MA 02111

Dear Tony:

Enclosed are the results of the analyses performed on the four aqueous and sixteen samples for MBTA: JFK/UMass (Project No. 8730C). This project was received under chain of custody at Enseco - Erco Laboratory on May 16, 1988, and was processed for a three-week turnaround time. A brief description of the Quality Assurance/Quality Control and methods employed by Enseco are contained within the report. This letter authorizes the release of the analytical results and should be considered an integral part of this report.

Please refer to this project by the Erco Laboratory Identification No. 7865 to help expedite any future discussions. We will be happy to answer any questions or concerns that you may have.

Sincerely,

Clyde E. Tressler  
Client Service Representative

Thomas R. Copeland, Ph.D.  
Technical Director

Encl.

KRA _____	CMM _____
JGA _____	JSN _____
WAC _____	JCO _____
HPC _____	JPO _____
RAO _____	JAP _____
KJO _____	AP _____
DED _____	TJR _____
RCD _____	PRR _____
AJF _____	JGS _____
DNG _____	ALS _____
VPL _____	AMS _____
PJL _____	AJT _____
LAM _____	TMT _____
MPM _____	PDW _____
ARM _____	
FILE: _____	

QUALITY ASSURANCE/QUALITY CONTROL

## QUALITY ASSURANCE/QUALITY CONTROL

As an indication of the overall quality of the data generated by Enseco - Erco Laboratory for this report, the following controls have been provided (when applicable).

Reagent or analytical blanks are analyzed to assess the level of contamination which exists in the analytical system. An analytical blank, analyzed with every batch of samples, consists of reagents specific to the method. This blank is carried through every aspect of the procedure, including preparation, cleanup, and analysis. Ideally, the concentration of an analyte in the blank is below the reporting limit for that analyte. However, some common laboratory solvents and metals are difficult to eliminate to the part-per-billion levels commonly reported in environmental analyses. Therefore, analytical data are corrected for blank contamination before they are reported to the client.

Laboratory control samples (LCS) are used to monitor the laboratory's day-to-day performance of routine analytical methods. An LCS consists of a standard, control matrix which is spiked with a group of target compounds representative of the method analytes. The LCS is analyzed with environmental samples to provide evidence that the laboratory is performing the method within accepted QC guidelines.

An LCS has been established for most routine analytical methods. Reagent water is used as the control matrix for the analysis of aqueous samples. The LCS compounds are spiked into reagent water and carried through the appropriate steps of the analysis. As stated in SW-846 (third edition), a universal blank matrix does not exist for solid samples and therefore no matrix is used. The LCS for solid samples consists of the LCS compounds spiked into a reagent blank and carried through the appropriate steps of the analysis. The data thus obtained are used to set the LCS control limits. As sufficient laboratory data become available, the control limits are redefined based upon the most recent six months of LCS data. Control limits for accuracy are based on the historical average recovery of the LCS plus or minus three standard deviation units.

Surrogates are organic compounds that are similar to the analytes of interest in chemical behavior but which are not normally found in environmental samples. Enseco routinely adds surrogates to samples requiring GS/MS analysis and reports these surrogate recoveries to the client. These surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Results are reported in terms of percent recovery.

AROMATIC VOLATILE ORGANICS

EPA Method 602

Client Name: Sverdrup Corporation  
 Client ID: Laboratory Control Spike  
 Laboratory ID: PG911  
 Matrix: Aqueous Sampled: NA Received: NA  
 Authorized: NA Prepared: 05/20/88 Analyzed: 05/20/88

Parameter	Result	Units	Percent Recovery*	QC Advisory Limits**
Benzene -----	19	µg/L	97	40-150%
Ethyl benzene -----	19	µg/L	97	23-160%
1,3-Dichlorobenzene -----	20	µg/L	99	50-141%

\*Percent recovery is based on a spike concentration of 20 ppb.

\*\*Ranges from Federal Register, October 26, 1984

NA = Not applicable.

Reported by UA Approved by 172

AROMATIC VOLATILE ORGANICS

EPA Method 602

Client Name: Sverdrup Corporation  
 Client ID: Laboratory Control Spike Dup.  
 Laboratory ID: PG920  
 Matrix: Aqueous      Sampled: NA      Received: NA  
 Authorized: NA      Prepared: 05/20/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Relative Percent Difference*</u>	<u>QC Advisory Limits</u>
Benzene -----	20	µg/L	0.7	<30%
Ethyl benzene -----	19	µg/L	2.5	<30%
1,3-Dichlorobenzene -----	20	µg/L	2.1	<30%

\*Relative percent difference is calculated as  $100\% (CI-CII)/0.5 (CI+CII)$  where CI and CII are the duplicate concentrations.

NA = Not applicable.

Reported by UA      Approved by [Signature]

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
Client ID: Erco Blank  
Laboratory ID: 7865-04B  
Matrix: Aqueous      Sampled: NA      Received: NA  
Authorized: NA      Prepared: 05/17/88      Analyzed: 05/18/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon	ND	mg/L	0.5

NA = Not applicable.

ND = Not detected.

Reported by LT      Approved by JKD



PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: Erco Blank  
 Laboratory ID: 7885-01B  
 Matrix: Solid      Sampled: NA      Received: NA  
 Authorized: NA      Prepared: 05/17/88      Analyzed: 05/19/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon	ND	µg/g (dry wt)	20

Solid content = 100%

NA = Not applicable.

ND = Not detected.

Reported by LT      Approved by JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: Erco Blank  
 Laboratory ID: 7866-02B  
 Matrix: Solid Sampled: NA Received: NA  
 Authorized: NA Prepared: 05/17/88 Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon	ND	µg/g (dry wt)	20

Solid content = 100%

NA = Not applicable.

ND = Not detected.

Reported by LT Approved by JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: Laboratory Control Spike  
 Laboratory ID: 7865-20BS  
 Matrix: Solid Sampled: NA Received: NA  
 Authorized: NA Prepared: 05/18/88 Analyzed: 05/20/88

<u>Parameter</u>	<u>Result**</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	260 (130)	µg/g (dry wt)	20

Solid content = 100%

\*\*Value in parentheses represents percent spike recovery.

NA = Not applicable.

Reported by LT Approved by JKD

# PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: Laboratory Control Spike Dup.  
 Laboratory ID: 7865-20BSD  
 Matrix: Solid Sampled: NA Received: NA  
 Authorized: NA Prepared: 05/18/88 Analyzed: 05/20/88

<u>Parameter</u>	<u>Result**</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	280 (135)	µg/g (dry wt)	20

Solid content = 100%

\*\*Value in parentheses represents percent spike recovery.

NA = Not applicable.

Reported by LT Approved by JKD

## PETROLEUM HYDROCARBONS ANALYSIS BY IR

EPA Method 418.1

QUALITY CONTROL

Client Name: Sverdrup Corporation  
Client ID: Laboratory Control Spike  
Laboratory ID: 7865-20BS  
Matrix: Solid      Sampled: NA      Received: NA  
Authorized: NA      Prepared: 05/18/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
Petroleum hydrocarbons	130	48 - 110%

NA = Not applicable.

Reported by LT      Approved by JKD

## PETROLEUM HYDROCARBONS ANALYSIS BY IR

EPA Method 418.1

QUALITY CONTROL

Client Name: Sverdrup Corporation  
Client ID: Laboratory Control Spike Dup.  
Laboratory ID: 7865-20BSD  
Matrix: Solid      Sampled: NA      Received: NA  
Authorized: NA      Prepared: 05/18/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
Petroleum hydrocarbons	135	48 - 110%

NA = Not applicable.

Reported by LT      Approved by JKD

ANALYTICAL RESULTS

## ANALYTICAL RESULTS

The method number provided on each data report sheet refers to a publication originating from a regulatory or standard-setting organization. In general, the methods employed are those specified by the U.S. Environmental Protection Agency and other state and federal agencies. In cases where an approved regulatory method does not exist, a method developed by Enseco will be employed to meet the specific needs of the client. The methods commonly employed by Enseco are based on methods from the following references.

U.S. Environmental Protection Agency. 1983. Methods for chemical analysis of water and wastes. EPA-600/4-79-020. Cincinnati, OH, March.

U.S. Environmental Protection Agency. 1984. Test methods for evaluating solid waste, physical/chemical methods. (SW-846); Washington, D.C. April.

U.S. Environmental Protection Agency. 1986. Methods for the determination of organic compounds in finished drinking water and raw source water. Cincinnati, OH, September.

"Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," 40 CFR, Part 136; Federal Register, Vol. 49, No. 209 (1984).

American Public Health Association, American Water Works Association, Water Pollution Control Federation. 1985. Standard methods for the examination of water and wastewater, 16th Edition. Washington, D.C., April.

Current EPA Contract Laboratory Program (CLP) protocols for the analysis of organic and inorganic hazardous substances including chlorinated dioxins and furans.



AROMATIC VOLATILE ORGANICS

EPA Method 602

Client Name: Sverdrup Corporation  
 Client ID: PMW-1, Aq-1  
 Laboratory ID: 7865-01  
 Matrix: Aqueous      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/24/88      Analyzed: 05/24/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
p-Xylene	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
m-Xylene	ND	µg/L	1.0
o-Xylene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
p-Chlorotoluene	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0

ND = Not detected.

Reported by   *MA*   Approved by   *[Signature]*

AROMATIC VOLATILE ORGANICS

EPA Method 602

Client Name: Sverdrup Corporation  
 Client ID: PMW-2, Aq-1  
 Laboratory ID: 7865-02  
 Matrix: Aqueous      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/20/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
p-Xylene	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
m-Xylene	ND	µg/L	1.0
o-Xylene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
p-Chlorotoluene	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0

ND = Not detected.

Reported by CA      Approved by [Signature]

AROMATIC VOLATILE ORGANICS

EPA Method 602

Client Name: Sverdrup Corporation  
 Client ID: PMW-3, Aq-1  
 Laboratory ID: 7865-03  
 Matrix: Aqueous      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/20/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
p-Xylene	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
m-Xylene	ND	µg/L	1.0
o-Xylene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
p-Chlorotoluene	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0

ND = Not detected.

Reported by  Approved by 

AROMATIC VOLATILE ORGANICS

EPA Method 602

Client Name: Sverdrup Corporation  
 Client ID: PMW-4, Aq-1  
 Laboratory ID: 7865-04  
 Matrix: Aqueous      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/20/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
p-Xylene	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
m-Xylene	ND	µg/L	1.0
o-Xylene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
p-Chlorotoluene	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0

ND = Not detected.

Reported by       Approved by 

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-1, S-1  
 Laboratory ID: 7865-05  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/03/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	53
Toluene	ND	µg/kg (dry wt)	53
Ethylbenzene	ND	µg/kg (dry wt)	53
p-Xylene	ND	µg/kg (dry wt)	53
Chlorobenzene	ND	µg/kg (dry wt)	53
m-Xylene	ND	µg/kg (dry wt)	53
o-Xylene	ND	µg/kg (dry wt)	53
Styrene	ND	µg/kg (dry wt)	53
n-Propylbenzene	ND	µg/kg (dry wt)	53
p-Chlorotoluene	ND	µg/kg (dry wt)	53
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	53
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	53
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	53
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	53
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	53

Solid content = 94%

ND = Not detected.

Reported by       Approved by 

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-1, S-2  
 Laboratory ID: 7865-06  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/03/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	28
Toluene	ND	µg/kg (dry wt)	28
Ethylbenzene	ND	µg/kg (dry wt)	28
p-Xylene	ND	µg/kg (dry wt)	28
Chlorobenzene	ND	µg/kg (dry wt)	28
m-Xylene	ND	µg/kg (dry wt)	28
o-Xylene	ND	µg/kg (dry wt)	28
Styrene	ND	µg/kg (dry wt)	28
n-Propylbenzene	ND	µg/kg (dry wt)	28
p-Chlorotoluene	ND	µg/kg (dry wt)	28
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	28
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	28

Solid content = 89%

ND = Not detected.

Reported by  Approved by 

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-1, S-3  
 Laboratory ID: 7865-07  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/03/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	110
Toluene	ND	µg/kg (dry wt)	110
Ethylbenzene	ND	µg/kg (dry wt)	110
p-Xylene	ND	µg/kg (dry wt)	110
Chlorobenzene	ND	µg/kg (dry wt)	110
m-Xylene	ND	µg/kg (dry wt)	110
o-Xylene	ND	µg/kg (dry wt)	110
Styrene	ND	µg/kg (dry wt)	110
n-Propylbenzene	ND	µg/kg (dry wt)	110
p-Chlorotoluene	ND	µg/kg (dry wt)	110
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	110
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	110
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	110
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	110
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	110

Solid content = 23%

ND = Not detected.

Reported by          Approved by

## AROMATIC VOLATILE ORGANICS



EPA Method 8020

Client Name: Sverdrup Corporation  
Client ID: PMW-1, S-4  
Laboratory ID: 7865-08  
Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/03/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	30
Toluene	ND	µg/kg (dry wt)	30
Ethylbenzene	ND	µg/kg (dry wt)	30
p-Xylene	ND	µg/kg (dry wt)	30
Chlorobenzene	ND	µg/kg (dry wt)	30
m-Xylene	ND	µg/kg (dry wt)	30
o-Xylene	ND	µg/kg (dry wt)	30
Styrene	ND	µg/kg (dry wt)	30
n-Propylbenzene	ND	µg/kg (dry wt)	30
p-Chlorotoluene	ND	µg/kg (dry wt)	30
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	30
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	30
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	30
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	30
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	30

Solid content = 82%

ND = Not detected.

Reported by   *CR*   Approved by   *MS*



AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-2, S-1  
 Laboratory ID: 7865-09  
 Matrix: Solid Sampled: 05/14/88 Received: 05/16/88  
 Authorized: 05/16/88 Prepared: 05/17/88 Analyzed: 06/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	27
Toluene	ND	µg/kg (dry wt)	27
Ethylbenzene	ND	µg/kg (dry wt)	27
p-Xylene	ND	µg/kg (dry wt)	27
Chlorobenzene	ND	µg/kg (dry wt)	27
m-Xylene	ND	µg/kg (dry wt)	27
o-Xylene	ND	µg/kg (dry wt)	27
Styrene	ND	µg/kg (dry wt)	27
n-Propylbenzene	ND	µg/kg (dry wt)	27
p-Chlorotoluene	ND	µg/kg (dry wt)	27
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	27
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	27
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	27
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	27
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	27

Solid content = 92%

ND = Not detected.

Reported by UA Approved by UA

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-2, S-2  
 Laboratory ID: 7865-10  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/06/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	27
Toluene	ND	µg/kg (dry wt)	27
Ethylbenzene	ND	µg/kg (dry wt)	27
p-Xylene	ND	µg/kg (dry wt)	27
Chlorobenzene -----	1,200	µg/kg (dry wt)	27
m-Xylene	ND	µg/kg (dry wt)	27
o-Xylene	ND	µg/kg (dry wt)	27
Styrene	ND	µg/kg (dry wt)	27
n-Propylbenzene	ND	µg/kg (dry wt)	27
p-Chlorotoluene	ND	µg/kg (dry wt)	27
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	27
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	27
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	27
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	27
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	27

Solid content = 92%

ND = Not detected.

Reported by WA      Approved by [Signature]

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-2, S-3  
 Laboratory ID: 7865-11  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/06/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	32
Toluene	ND	µg/kg (dry wt)	32
Ethylbenzene	ND	µg/kg (dry wt)	32
p-Xylene	ND	µg/kg (dry wt)	32
Chlorobenzene	ND	µg/kg (dry wt)	32
m-Xylene	ND	µg/kg (dry wt)	32
o-Xylene	ND	µg/kg (dry wt)	32
Styrene	ND	µg/kg (dry wt)	32
n-Propylbenzene	ND	µg/kg (dry wt)	32
p-Chlorotoluene	ND	µg/kg (dry wt)	32
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	32
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	32
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	32
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	32
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	32

Solid content = 79%

ND = Not detected.

Reported by    *W*         Approved by    *W*

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-2, S-4  
 Laboratory ID: 7865-12  
 Matrix: Solid Sampled: 05/14/88 Received: 05/16/88  
 Authorized: 05/16/88 Prepared: 05/17/88 Analyzed: 06/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	29
Toluene	ND	µg/kg (dry wt)	29
Ethylbenzene	ND	µg/kg (dry wt)	29
p-Xylene	ND	µg/kg (dry wt)	29
Chlorobenzene	ND	µg/kg (dry wt)	29
m-Xylene	ND	µg/kg (dry wt)	29
o-Xylene	ND	µg/kg (dry wt)	29
Styrene	ND	µg/kg (dry wt)	29
n-Propylbenzene	ND	µg/kg (dry wt)	29
p-Chlorotoluene	ND	µg/kg (dry wt)	29
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	29
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	29
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	29
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	29
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	29

Solid content = 85%

ND = Not detected.

Reported by        Approved by

## AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation

Client ID: PMW-3, S-1

Laboratory ID: 7865-13

Matrix: Solid

Sampled: 05/14/88

Received: 05/16/88

Authorized: 05/16/88

Prepared: 05/17/88

Analyzed: 06/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	26
Toluene	ND	µg/kg (dry wt)	26
Ethylbenzene	ND	µg/kg (dry wt)	26
p-Xylene	ND	µg/kg (dry wt)	26
Chlorobenzene	ND	µg/kg (dry wt)	26
m-Xylene	ND	µg/kg (dry wt)	26
o-Xylene	ND	µg/kg (dry wt)	26
Styrene	ND	µg/kg (dry wt)	26
n-Propylbenzene	ND	µg/kg (dry wt)	26
p-Chlorotoluene	ND	µg/kg (dry wt)	26
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	26
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	26
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	26
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	26
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	26

Solid content = 96%

ND = Not detected.

Reported by

Approved by

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-3, S-2  
 Laboratory ID: 7865-14  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	34
Toluene	ND	µg/kg (dry wt)	34
Ethylbenzene	ND	µg/kg (dry wt)	34
p-Xylene	ND	µg/kg (dry wt)	34
Chlorobenzene	ND	µg/kg (dry wt)	34
m-Xylene	ND	µg/kg (dry wt)	34
o-Xylene	ND	µg/kg (dry wt)	34
Styrene	ND	µg/kg (dry wt)	34
n-Propylbenzene	ND	µg/kg (dry wt)	34
p-Chlorotoluene	ND	µg/kg (dry wt)	34
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	34
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	34
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	34
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	34
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	34

Solid content = 74%

ND = Not detected.

Reported by WA      Approved by mt

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-3, S-3  
 Laboratory ID: 7865-15  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/06/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	93
Toluene	ND	µg/kg (dry wt)	93
Ethylbenzene	ND	µg/kg (dry wt)	93
p-Xylene	ND	µg/kg (dry wt)	93
Chlorobenzene	ND	µg/kg (dry wt)	93
m-Xylene	ND	µg/kg (dry wt)	93
o-Xylene	ND	µg/kg (dry wt)	93
Styrene	ND	µg/kg (dry wt)	93
n-Propylbenzene	ND	µg/kg (dry wt)	93
p-Chlorotoluene	ND	µg/kg (dry wt)	93
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	93
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	93
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	93
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	93
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	93

Solid content = 27%

ND = Not detected.

Reported by                      Approved by

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-3, S-4  
 Laboratory ID: 7865-16  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/06/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	31
Toluene	ND	µg/kg (dry wt)	31
Ethylbenzene	ND	µg/kg (dry wt)	31
p-Xylene	ND	µg/kg (dry wt)	31
Chlorobenzene	ND	µg/kg (dry wt)	31
m-Xylene	ND	µg/kg (dry wt)	31
o-Xylene	ND	µg/kg (dry wt)	31
Styrene	ND	µg/kg (dry wt)	31
n-Propylbenzene	ND	µg/kg (dry wt)	31
p-Chlorotoluene	ND	µg/kg (dry wt)	31
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	31
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	31
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	31
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	31
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	31

Solid content = 81%

ND = Not detected.

Reported by ew      Approved by ma



AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-4, S-1  
 Laboratory ID: 7865-17  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/07/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	28
Toluene	ND	µg/kg (dry wt)	28
Ethylbenzene	ND	µg/kg (dry wt)	28
p-Xylene	ND	µg/kg (dry wt)	28
Chlorobenzene	ND	µg/kg (dry wt)	28
m-Xylene	ND	µg/kg (dry wt)	28
o-Xylene	ND	µg/kg (dry wt)	28
Styrene	ND	µg/kg (dry wt)	28
n-Propylbenzene	ND	µg/kg (dry wt)	28
p-Chlorotoluene	ND	µg/kg (dry wt)	28
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	28
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	28

Solid content = 91%

ND = Not detected.

Reported by LM      Approved by MM

AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation  
 Client ID: PMW-4, S-2  
 Laboratory ID: 7865-18  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 06/07/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	28
Toluene	ND	µg/kg (dry wt)	28
Ethylbenzene	ND	µg/kg (dry wt)	28
p-Xylene	ND	µg/kg (dry wt)	28
Chlorobenzene	ND	µg/kg (dry wt)	28
m-Xylene	ND	µg/kg (dry wt)	28
o-Xylene	ND	µg/kg (dry wt)	28
Styrene	ND	µg/kg (dry wt)	28
n-Propylbenzene	ND	µg/kg (dry wt)	28
p-Chlorotoluene	ND	µg/kg (dry wt)	28
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	28
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	28
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	28

Solid content = 90%

ND = Not detected.

Reported by                      Approved by

# AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation

Client ID: PMW-4, S-3

Laboratory ID: 7865-19

Matrix: Solid

Sampled: 05/14/88

Received: 05/16/88

Authorized: 05/16/88

Prepared: 05/17/88

Analyzed: 06/07/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	100
Toluene	ND	µg/kg (dry wt)	100
Ethylbenzene	ND	µg/kg (dry wt)	100
p-Xylene	ND	µg/kg (dry wt)	100
Chlorobenzene	ND	µg/kg (dry wt)	100
m-Xylene	ND	µg/kg (dry wt)	100
o-Xylene	ND	µg/kg (dry wt)	100
Styrene	ND	µg/kg (dry wt)	100
n-Propylbenzene	ND	µg/kg (dry wt)	100
p-Chlorotoluene	ND	µg/kg (dry wt)	100
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	100
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	100
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	100
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	100
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	100

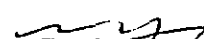
Solid content = 25%

ND = Not detected.

Reported by



Approved by



AROMATIC VOLATILE ORGANICS

EPA Method 8020

Client Name: Sverdrup Corporation

Client ID: PMW-4, S-4

Laboratory ID: 7865-20

Matrix: Solid

Sampled: 05/14/88

Received: 05/16/88

Authorized: 05/16/88

Prepared: 05/17/88

Analyzed: 06/07/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Benzene	ND	µg/kg (dry wt)	29
Toluene	ND	µg/kg (dry wt)	29
Ethylbenzene	ND	µg/kg (dry wt)	29
p-Xylene	ND	µg/kg (dry wt)	29
Chlorobenzene	ND	µg/kg (dry wt)	29
m-Xylene	ND	µg/kg (dry wt)	29
o-Xylene	ND	µg/kg (dry wt)	29
Styrene	ND	µg/kg (dry wt)	29
n-Propylbenzene	ND	µg/kg (dry wt)	29
p-Chlorotoluene	ND	µg/kg (dry wt)	29
1,2,4-Trimethylbenzene	ND	µg/kg (dry wt)	29
1,4-Dichlorobenzene	ND	µg/kg (dry wt)	29
1,3-Dichlorobenzene	ND	µg/kg (dry wt)	29
1,2-Dichlorobenzene	ND	µg/kg (dry wt)	29
1,2,4-Trichlorobenzene	ND	µg/kg (dry wt)	29

Solid content = 85%

ND = Not detected.

Reported by GA Approved by [Signature]

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup CorporationClient ID: PMW-1, Ag-1Laboratory ID: 7865-01Matrix: AqueousSampled: 05/14/88Received: 05/16/88Authorized: 05/16/88Prepared: 05/17/88Analyzed: 05/19/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	3.3	mg/L	0.5

Reported by LTApproved by JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
Client ID: PMW-2, Aq-1  
Laboratory ID: 7865-02  
Matrix: Aqueous      Sampled: 05/14/88      Received: 05/16/88  
Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 05/19/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon	ND	mg/L	0.5

ND = Not detected.

Reported by LT      Approved by JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup CorporationClient ID: PMW-3, Aq-1Laboratory ID: 7865-03Matrix: AqueousSampled: 05/14/88Received: 05/16/88Authorized: 05/16/88Prepared: 05/17/88Analyzed: 05/19/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon	ND	mg/L	0.5

ND = Not detected.

Reported by LTApproved by JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: PMW-4, Aq-1  
 Laboratory ID: 7865-04  
 Matrix: Aqueous      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 05/19/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon	ND	mg/L	0.5

ND = Not detected.

Reported by LT      Approved by JKD



PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: PMW-1, S-1  
 Laboratory ID: 7865-05  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 05/24/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	1,400	µg/g (dry wt)	200

Solid content = 74%

Reported by LT      Approved by JKD



PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: PMW-1, S-2  
 Laboratory ID: 7865-06  
 Matrix: Solid Sampled: 05/14/88 Received: 05/16/88  
 Authorized: 05/16/88 Prepared: 05/17/88 Analyzed: 05/24/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	3,100	µg/g (dry wt)	400

Solid content = 92%

Reported by LT Approved by JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation

Client ID: PMW-1, S-3

Laboratory ID: 7865-07

Matrix: Solid

Sampled: 05/14/88

Received: 05/16/88

Authorized: 05/16/88

Prepared: 05/17/88

Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	120	µg/g (dry wt)	20

Solid content = 36%

Reported by LT

Approved by JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: PMW-1, S-4  
 Laboratory ID: 7865-08  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	28	µg/g (dry wt)	20

Solid content = 85%

Reported by LT      Approved by JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: PMW-2, S-1  
 Laboratory ID: 7865-09  
 Matrix: Solid Sampled: 05/14/88 Received: 05/16/88  
 Authorized: 05/16/88 Prepared: 05/17/88 Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	140	µg/g (dry wt)	20

Solid content = 97%

Reported by LT Approved by JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup CorporationClient ID: PMW-2, S-2Laboratory ID: 7865-10Matrix: SolidSampled: 05/14/88Received: 05/16/88Authorized: 05/16/88Prepared: 05/17/88Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	40	µg/g (dry wt)	20

Solid content = 87%

Reported by LT Approved by JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
Client ID: PMW-2, S-3  
Laboratory ID: 7865-11  
Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
Authorized: 05/16/88      Prepared: 05/17/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	84	µg/g (dry wt)	20

Solid content = 75%

Reported by LT      Approved by JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup CorporationClient ID: PMW-2, S-4Laboratory ID: 7865-12Matrix: SolidSampled: 05/14/88Received: 05/16/88Authorized: 05/16/88Prepared: 05/17/88Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	97	µg/g (dry wt)	20

Solid content = 87%

Reported by LTApproved by JKD



## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup CorporationClient ID: PMW-3, S-1Laboratory ID: 7865-13Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88Authorized: 05/16/88      Prepared: 05/18/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	68	µg/g (dry wt)	20

Solid content = 91%

Reported by

LT

Approved by

JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
Client ID: PMW-3, S-2  
Laboratory ID: 7865-14  
Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
Authorized: 05/16/88      Prepared: 05/18/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon	ND	µg/g (dry wt)	20

Solid content = 53%

ND = Not detected.

Reported by LT      Approved by JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
Client ID: PMW-3, S-3  
Laboratory ID: 7865-15  
Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
Authorized: 05/16/88      Prepared: 05/18/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	310	µg/g (dry wt)	20

Solid content = 28%

Reported by LT      Approved by JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: PMW-3, S-4  
 Laboratory ID: 7865-16  
 Matrix: Solid Sampled: 05/14/88 Received: 05/16/88  
 Authorized: 05/16/88 Prepared: 05/18/88 Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	32	µg/g (dry wt)	20

Solid content = 83%

Reported by LT Approved by JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: PMW-4, S-1  
 Laboratory ID: 7865-17  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/18/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	240	µg/g (dry wt)	40

Solid content = 95%

Reported by LT      Approved by JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup CorporationClient ID: PMW-4, S-2Laboratory ID: 7865-18Matrix: SolidSampled: 05/14/88Received: 05/16/88Authorized: 05/16/88Prepared: 05/18/88Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	55	µg/g (dry wt)	20

Solid content = 95%

Reported by

LT

Approved by

JKD

PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup Corporation  
 Client ID: PMW-4, S-3  
 Laboratory ID: 7865-19  
 Matrix: Solid      Sampled: 05/14/88      Received: 05/16/88  
 Authorized: 05/16/88      Prepared: 05/18/88      Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon -----	39	µg/g (dry wt)	20

Solid content = 87%

Reported by LT      Approved by JKD

## PETROLEUM HYDROCARBON ANALYSIS BY IR

EPA Method 418.1

Client Name: Sverdrup CorporationClient ID: PMW-4, S-4Laboratory ID: 7865-20Matrix: SolidSampled: 05/14/88Received: 05/16/88Authorized: 05/16/88Prepared: 05/18/88Analyzed: 05/20/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Petroleum hydrocarbon	ND	µg/g (dry wt)	20

Solid content = 86%

ND = Not detected.

Reported by LTApproved by JKD



CLIENT: Sverdrup Corporation OIL AND GREASE  
SAMPLE RECEIVED: 05/16/88  
ANALYSIS COMPLETED: 05/25/88 EPA METHOD 413.1  
RESULTS IN: mg/L (ppm)  
REPORTED BY: BL  
CHECKED BY: AH - Data Report -

Erco ID	Client ID	Oil & Grease	Solid Content (%)
7865-01	PMW-1, Aq-1	51	NA
7865-02	PMW-2, Aq-1	1.2	NA
7865-03	PMW-3, Aq-1	ND	NA
7865-04	PMW-4, Aq-1	2.8	NA

If customer has any questions regarding analysis, refer to sample in question by its Erco ID #.

Minimum reporting limit = 1.0 mg/L.

All samples are corrected for the method blank.

NA = Not applicable.

ND = Not detected.

CLIENT: Sverdrup Corporation OIL AND GREASE  
SAMPLE RECEIVED: 05/16/88  
ANALYSIS COMPLETED: 05/25/88 EPA METHOD 413.1  
RESULTS IN: mg/g (dry wt)  
REPORTED BY: BL  
CHECKED BY: AH - Data Report -

Erco ID	Client ID	Oil & Grease	Solid Content (%)
7865-05	PMW-1, S-1	0.31	94
7865-06	PMW-1, S-2	5.5	90
7865-07	PMW-1, S-3	0.78	22
7865-08	PMW-1, S-4	ND	80
7865-10	PMW-2, S-2	ND	98
7865-11	PMW-2, S-3	1.2	23
7865-12	PMW-2, S-4	ND	87
7865-13	PMW-3, S-1	0.15	93
7865-14	PMW-3, S-2	0.51	70
7865-15	PMW-3, S-3	1.0	22
7865-16	PMW-3, S-4	ND	81
7865-17	PMW-4, S-1	0.85	90
7865-18	PMW-4, S-2	0.29	93
7865-19	PMW-4, S-3	0.49	40
7865-20	PMW-4, S-4	ND	86

If customer has any questions regarding analysis, refer to sample in question by its Erco ID #.

Minimum reporting limit = 0.1 mg/g (dry wt).

All samples are corrected for the method blank.

ND = Not detected.



July 11, 1988

Mr. Anthony Tawa  
Sverdrup Corporation  
38 Chauncy Street  
Boston, MA 02111

Dear Tony:

Enclosed are the results of the analyses performed on the two samples for MBTA: JFK/UMass. This project was rebooked on June 30, 1988, and was processed for a one-week turnaround time. A brief description of the Quality Assurance/Quality Control and methods employed by Enseco are contained within the report. This letter authorizes the release of the analytical results and should be considered an integral part of this report.

Please refer to this project by the Erco Laboratory Identification No. 8356 to help expedite any future discussions. We will be happy to answer any questions or concerns that you may have.

Sincerely,

Clyde E. Tressler  
Client Service Representative

Thomas R. Copeland, Ph.D.  
Technical Director

Encl.

KRA _____	CMM _____
JGA _____	JSN _____
WAC _____	JCO _____
HPC _____	JPO _____
RAD _____	JAP _____
KJD _____	AP _____
DED _____	TJR _____
RCD _____	PRR _____
AJF _____	JGS _____
DMG _____	ALS _____
VPL _____	AWS _____
PJL _____	AJT _____
LAM _____	TMT _____
MPM _____	PDW _____
ARM _____	
FILE: _____	

QUALITY ASSURANCE/QUALITY CONTROL

## QUALITY ASSURANCE/QUALITY CONTROL

As an indication of the overall quality of the data generated by Enseco - Erco Laboratory for this report, the following controls have been provided (when applicable).

Reagent or analytical blanks are analyzed to assess the level of contamination which exists in the analytical system. An analytical blank, analyzed with every batch of samples, consists of reagents specific to the method. This blank is carried through every aspect of the procedure, including preparation, cleanup, and analysis. Ideally, the concentration of an analyte in the blank is below the reporting limit for that analyte. However, some common laboratory solvents and metals are difficult to eliminate to the part-per-billion levels commonly reported in environmental analyses. Therefore, analytical data are corrected for blank contamination before they are reported to the client.

Laboratory control samples (LCS) are used to monitor the laboratory's day-to-day performance of routine analytical methods. An LCS consists of a standard, control matrix which is spiked with a group of target compounds representative of the method analytes. The LCS is analyzed with environmental samples to provide evidence that the laboratory is performing the method within accepted QC guidelines.

An LCS has been established for most routine analytical methods. Reagent water is used as the control matrix for the analysis of aqueous samples. The LCS compounds are spiked into reagent water and carried through the appropriate steps of the analysis. As stated in SW-846 (third edition), a universal blank matrix does not exist for solid samples and therefore no matrix is used. The LCS for solid samples consists of the LCS compounds spiked into a reagent blank and carried through the appropriate steps of the analysis. The data thus obtained are used to set the LCS control limits. As sufficient laboratory data become available, the control limits are redefined based upon the most recent six months of LCS data. Control limits for accuracy are based on the historical average recovery of the LCS plus or minus three standard deviation units.

Surrogates are organic compounds that are similar to the analytes of interest in chemical behavior but which are not normally found in environmental samples. Enseco routinely adds surrogates to samples requiring GS/MS analysis and reports these surrogate recoveries to the client. These surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Results are reported in terms of percent recovery.

HYDROCARBON FINGERPRINTING  
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM  
MARINE ORGANICS LABORATORY

Client Name: Sverdrup Corporation

Matrix: Solid

Authorized: NA

Sampled: NA

Received: NA

Concentration Units: µg/g (dry wt)

Prepared: 07/05/88

Analyzed: 07/06/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
8293-09B	Erco Blank	ND	0.2	5.0	NA

Qualitative Identification: NA

NA = Not applicable.

ND = Not detected at or above reporting limit.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.2 µg/g (dry wt).

Minimum reporting limit for total products = 5.0 µg/g (dry wt).

Internal standard recovery = 117%.

Reported by

BL

Approved by

mm

HYDROCARBON FINGERPRINTING  
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM  
MARINE ORGANICS LABORATORY

Client Name: Sverdrup Corporation

Matrix: Aqueous

Authorized: NA

Sampled: NA

Received: NA

Concentration Units: mg/L (ppm)

Prepared: 07/05/88

Analyzed: 07/06/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
0068-05B	Erco Blank	0.14	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 96%.

Reported by BL Approved by mm

HYDROCARBON FINGERPRINTING  
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM  
MARINE ORGANICS LABORATORY

QUALITY CONTROL

Client Name: Sverdrup Corporation  
 Client ID: Laboratory Control Spike  
 Laboratory ID: 8321-04BS  
 Matrix: Aqueous      Sampled: NA      Received: NA  
 Authorized: NA      Prepared: 06/29/88      Analyzed: 07/05/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
ortho-Terphenyl	101	60 - 120%
Fuel Oil No. 2	92	60 - 120%

NA = Not applicable.

Reported by BL      Approved by mm



HYDROCARBON FINGERPRINTING  
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM  
MARINE ORGANICS LABORATORY

QUALITY CONTROL

Client Name: Sverdrup Corporation  
 Client ID: Laboratory Control Spike Dup.  
 Laboratory ID: 8321-04BSD  
 Matrix: Aqueous      Sampled: NA      Received: NA  
 Authorized: NA      Prepared: 06/29/88      Analyzed: 07/05/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
ortho-Terphenyl	102	60 - 120%
Fuel Oil No. 2	86	60 - 120%

NA = Not applicable.

Reported by BL      Approved by mm

ANALYTICAL RESULTS

## ANALYTICAL RESULTS

The method number provided on each data report sheet refers to a publication originating from a regulatory or standard-setting organization. In general, the methods employed are those specified by the U.S. Environmental Protection Agency and other state and federal agencies. In cases where an approved regulatory method does not exist, a method developed by Enseco will be employed to meet the specific needs of the client. The methods commonly employed by Enseco are based on methods from the following references.

U.S. Environmental Protection Agency. 1983. Methods for chemical analysis of water and wastes. EPA-600/4-79-020. Cincinnati, OH, March.

U.S. Environmental Protection Agency. 1984. Test methods for evaluating solid waste, physical/chemical methods. (SW-846); Washington, D.C. April.

U.S. Environmental Protection Agency. 1986. Methods for the determination of organic compounds in finished drinking water and raw source water. Cincinnati, OH, September.

"Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," 40 CFR, Part 136; Federal Register, Vol. 49, No. 209 (1984).

American Public Health Association, American Water Works Association, Water Pollution Control Federation. 1985. Standard methods for the examination of water and wastewater, 16th Edition. Washington, D.C., April.

Current EPA Contract Laboratory Program (CLP) protocols for the analysis of organic and inorganic hazardous substances including chlorinated dioxins and furans.

HYDROCARBON FINGERPRINTING  
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM  
MARINE ORGANICS LABORATORY

Client Name: Sverdrup Corporation

Matrix: Aqueous

Authorized: 06/30/88

Sampled: 05/14/88

Received: 06/30/88

Concentration Units: mg/L (ppm)

Prepared: 07/05/88

Analyzed: 07/07/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
8356-01	PMW-1, Aq-1	29	0.13	3.1	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery was diluted out.

Reported by BL Approved by mm

HYDROCARBON FINGERPRINTING  
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM  
MARINE ORGANICS LABORATORY

Client Name: Sverdrup Corporation

Matrix: Solid

Authorized: 06/30/88      Sampled: 05/14/88      Received: 06/30/88

Concentration Units: µg/g (dry wt)      Prepared: 07/05/88      Analyzed: 07/08/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
8356-02	PMW-1, S-2	4,800	2.0	50	88

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.2 µg/g (dry wt).

Minimum reporting limit for total products = 5.0 µg/g (dry wt).

Internal standard recovery was diluted out.

Reported by BL      Approved by mm

SAMPLER, (Signature)

Phone

**Date Shipped****Carrier****Airbill No.**

Cooler No.

## SHIP TO:

**Enseco-ERCO Lab**  
**205 Alewife Brook Parkway**  
**Cambridge, MA 02138**  
**(617) 661-3111**

**SEND RESULTS TO:**

Client Name ~~Sverdrip Corp~~ Tony Iawa  
Company Sverdrip Corp  
Address 38 Chauncy St.  
Boston, MA 02111  
Phone (617) 482-7880

**ATTENTION:**

PROJECT NAME MBTA: JFK/UMass Demol. PROJECT NO. 8730 C P.O. NO. \_\_\_\_\_

Relinquished by: (Signature)

Received by: (Signature)

Date \_\_\_\_\_

Time

Relinquished by: (Signature)

Received by: (Signature)

Date \_\_\_\_\_

Time

Relinquished by: (Signature)

Received at lab by: (Signature)

Date \_\_\_\_\_

Time

Relinquished from lab by: (Signature)

Received by: (Signature)

**Date**

Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
<del>PMW-2/S-1</del>				
PMW-2/S-1	Soil (0-2')	5/14/88/7 <sup>20</sup> <sub>a</sub>	PHIR (1 bottle) ✓	
"	"	"	Prim. Vol. Org. (2 bottles) ✓	
"	No Sample Available	—	"O.G." — No Sample (empty 120 mL) ✓	
PMW-2/S-2	Soil (5-7')	5/14/88, 7 <sup>30</sup> <sub>a</sub>	PHIR (1 Bottle) ✓	
PMW-2/S-2	"	"	Prim. Vol. Org. (2 bottles) ✓	
PMW-2/S-2	"	"	O.G. (1 BOTTLE) ✓	

**Special Instructions/Comments:**

**NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT**

**Expected**

## Analytical

**Immediate**

**T.A.T's:**

**Attention (200% surcharge)**

**RUSH (50-100% surcharge)**

### Standard

**ERCO Booking Log Number:** *(for lab use only)*

## CHAIN-OF-CUSTODY RECORD

SAMPLER: (Signature)

Phone

Date Shipped

Airbill No.

Carrier

Cooler No.

SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION:

Clyde Tressler

SEND RESULTS TO:

Client Name

Company

Address

Phone

PROJECT NAME MBTA: JFK/UMass Demo 1 PROJECT NO. 9730C P.O. NO. \_\_\_\_\_

Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received at lab by: (Signature)	Date	Time
Relinquished from lab by: (Signature)	Received by: (Signature)	Date	Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
pmw-2, s-3	Soil (10'-12')	5/14, 7 <sup>40</sup>	PHIR (1 Bottle) ✓	
"	"	"	Atom. Vol. Org. (2 bottles) ✓	
"	"	"	O.G. (1 Bottle) ✓	
pmw-2, s-4	Soil (15'-17')	5/14, 7 <sup>50</sup>	PHIR (1 Bottle) ✓	
"	"	"	Atom. Vol. Org. (2 bottles) ✓	
"	"	"	O.G. (1 bottle) ✓	

Special Instructions/Comments:

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

Standard

ERCO Booking Log Number: (for lab use only)

## CHAIN-OF-CUSTODY RECORD

SAMPLER: (Signature)

Phone

Date Shipped

Airbill No.

Carrier

Cooler No.

## SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION: Clyde Tressler

## SEND RESULTS TO:

Client Name

Company

Address

Phone

PROJECT NAME MBTA: JFK/W Mass Demol. PROJECT NO. 8730C P.O. NO. \_\_\_\_\_

Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received at lab by: (Signature)	Date	Time
Relinquished from lab by: (Signature)	Received by: (Signature)	Date	Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
Pmw-4, S-1	Soil, 0'-2'	5-14-88, 8:30a	PHIR (1 bottle) ✓	
"	"	5-14-88, 8:30a	Arom. Vol. Org (2 bottles) ✓	
"	"	5-14-88, 8:30a	O.G. (1 bottle) ✓	
Pmw-4, S-2	Soil, 5'-7'	5-14-88, 8:30a	PHIR (1 bottle) ✓	
"	"	"	Arom. Vol. Org (2 bottles) ✓	
"	"	"	O.G. (1 bottle) ✓	

Special Instructions/Comments:

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

✓ Standard

ERCO Booking Log Number: (for lab use only)



## CHAIN-OF-CUSTODY RECORD

SAMPLER: (Signature)

Phone

Date Shipped

Airbill No.

Carrier

Cooler No.

## SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION:

Clyde Tressler

## SEND RESULTS TO:

Client Name

Company

Address

Phone

PROJECT NAME MBTA: JFK/UMass Demol. PROJECT NO. 8730 C P.O. NO. \_\_\_\_\_

Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received at lab by: (Signature)	Date	Time
Relinquished from lab by: (Signature)	Received by: (Signature)	Date	Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
<del>PMW-4,5-3</del>	<del>Soil, 10'-12'</del>	<del>5-14-88, 8<sup>40</sup> a</del>	<del>PHIR, (1 bottle)</del>	
PMW-4,5-3	Soil, 10'-12'	5-14-88, 8 <sup>40</sup> a	PHIR, (1 bottle) ✓	
"	"	"	Arom. Vol. Org. (2 bottles) -	
"	"	"	O.G., (1 bottle) -	
PMW-4,5-4	Soil, 15'-17'	5-14-88, 8 <sup>56</sup> a	PHIR, (1 bottle) ✓	
"	"	"	Arom. Vol. Org. (2 bottles) ✓	
"	"	"	O.G., (1 bottle) ✓	

Special Instructions/Comments:

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

Standard

ERCO Booking Log Number: (for lab use only)

## CHAIN-OF-CUSTODY RECORD

SAMPLE: (Signature)

Anthony J. Tressler

Phone

Date Shipped

Airbill No.

Carrier

Cooler No.

## SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION:

Clyde Tressler

## SEND RESULTS TO:

Client Name

Company

Address

Phone

See Page 1

PROJECT NAME MBTA: JFK/UMass Dental PROJECT NO. 8730 C P.O. NO.

Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received at lab by: (Signature)	Date	Time
Relinquished from lab by: (Signature)	Received by: (Signature)	Date	Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
Pow-1, S-1	Soil, 0'-2"	5-14-88, 9 <sup>25</sup> u	PHIR (1 bottle) ✓	
"	"	"	Arom Vol. Org. (2 bottles) ✓	
"	"	"	O/G (1 bottle) ✓	
Pow-1, S-2	Soil, 5'-7'	5-14-88, 9 <sup>40</sup> u	PHIR (1 bottle) ✓	
"	"	"	Arom Vol. Org. (2 bottles) ✓	
"	"	"	O/G (1 bottle) ✓	

Special Instructions/Comments:

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

✓ Standard

ERCO Booking Log Number: (for lab use only)

## CHAIN-OF-CUSTODY RECORD

SAMPLER: (Signature)

Anthony J. Tawa

Date Shipped

Carrier

Phone

Airbill No.

Cooler No.

## SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION:

Clyde Tressler

## SEND RESULTS TO:

Client Name

Company

Address

Phone

See Page 1

PROJECT NAME <sup>main</sup> JFK/Urban Demol.

PROJECT NO. 8730 C

P.O. NO.

Relinquished by: (Signature)

Received by: (Signature)

Date

Time

Relinquished by: (Signature)

Received by: (Signature)

Date

Time

Relinquished by: (Signature)

Received at lab by: (Signature)

Date

Time

Relinquished from lab by: (Signature)

Received by: (Signature)

Date

Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
Pmw-1, S-3	Soil, 10'-12'	5-14-88, 9:50 <sup>am</sup>	PHIR (1 bottle) ✓	
"	"	" 9:50 <sup>am</sup>	Arom Vol Org (2 bottles) ✓	
"	"	" 9:50 <sup>am</sup>	O.G. (1 bottle) ✓	
Pmw-1, S-4	Soil, 15'-17'	5-14-88, 10:10 <sup>am</sup>	PHIR (1 bottle) ✓	
"	"	" 10:10 <sup>am</sup>	Arom Vol Org (2 bottles) ✓	
"	"	" 10:10 <sup>am</sup>	O.G. (1 bottle) ✓	

Special Instructions/Comments:

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

✓ Standard

ERCO Booking Log Number: (for lab use only)

## CHAIN-OF-CUSTODY RECORD

SAMPLER: (Signature)

Phone

Date Shipped

Airbill No.

Carrier

Cooler No.

## SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION:

## SEND RESULTS TO:

Client Name

Company

Address

Phone

PROJECT NAME MBTA: JFK/Union Sq. Demol. PROJECT NO. 8730C P.O. NO. \_\_\_\_\_

Relinquished by: (Signature)

Received by: (Signature)

Date

Time

Relinquished by: (Signature)

Received by: (Signature)

Date

Time

Relinquished by: (Signature)

Received at lab by: (Signature)

Date

Time

Relinquished from lab by: (Signature)

Received by: (Signature)

Date

Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
PMW-35-1	Soil, 0'-2'	5-14-88, 10 <sup>30</sup>	PHIR ✓	
"	"	"	Arom. Vol. Org. ✓	
"	"	"	OIG ✓	
PMW-35-2	Soil, 5'-7'	5/14/88, 10 <sup>40</sup>	PHIR ✓	
"	"	"	Arom. Vol. Org. ✓	
"	"	"	OIG ✓	

Special Instructions/Comments:

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

✓ Standard

ERCO Booking Log Number: (for lab use only)

## CHAIN-OF-CUSTODY RECORD

SAMPLER: (Signature)

Anthony J. Tauriello

Phone \_\_\_\_\_

Date Shipped \_\_\_\_\_

Airbill No. \_\_\_\_\_

Carrier \_\_\_\_\_

Cooler No. \_\_\_\_\_

## SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION:

Clyde Treaster

## SEND RESULTS TO:

Client Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_

PROJECT NAME

MBTH: JFK/Unas DemolPROJECT NO. 87302

P.O. NO. \_\_\_\_\_

Relinquished by: (Signature)

Received by: (Signature)

Date

Time

Relinquished by: (Signature)

Received by: (Signature)

Date

Time

Relinquished by: (Signature)

Received at lab by: (Signature)

Date

Time

Relinquished from lab by: (Signature)

Received by: (Signature)

Date

Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
PMW-33-3	Soil, 10'-12'	5-14-88, 11 <sup>00</sup> a	PHIR ✓	
"	"	"	<del>From Vol. Org.</del> ✓	
"	"	"	O:G ✓	
PMW-33-4	Soil, 15'-17'	5-14-88, 11 <sup>00</sup> a	PHIR ✓	
"	"	"	From Vol. Org. ✓	
"	"	"	O:G ✓	

Special Instructions/Comments:

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

✓ Standard

ERCO Booking Log Number: (for lab use only)

## CHAIN-OF-CUSTODY RECORD

SAMPLER: (Signature)

Anthony J. Tawa

Phone \_\_\_\_\_

Date Shipped \_\_\_\_\_

Carrier \_\_\_\_\_

Airbill No. \_\_\_\_\_

Cooler No. \_\_\_\_\_

## SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION:

Clyde Tresaler

## SEND RESULTS TO:

Client Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_

See Page 1PROJECT NAME MBTA: JFK/W Mass Dred. PROJECT NO. 8730 C P.O. NO. \_\_\_\_\_

Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received at lab by: (Signature)	Date	Time
Relinquished from lab by: (Signature)	Received by: (Signature)	Date	Time

Anthony J. Tawa Vincent Hammack 05/16/88 1100hrs  
Anthony J. Tawa 5/16/88 11:00a

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
PMW-1, Aq-1	Aqueous	5.14.88/14 <sup>00</sup> p	PHIR (1 bottle) ✓	
"	"	"	Purgeable Aromatics (EPA 602) ✓	
"	"	"	OIG (1 Bottle) ✓	
PMW-2, Aq-1	Aqueous	5.14.88/1 <sup>15</sup> p	PHIR (1 bottle) ✓	
"	"	"	Purgeable Aromatics (EPA 602) ✓	
"	"	"	OIG (1 bottle) ✓	

Special Instructions/Comments:

Samples collected on 21<sup>st</sup> bailing for each well

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

Standard

ERCO Booking Log Number: (for lab use only)

## CHAIN-OF-CUSTODY RECORD

SAMPLER: (Signature)

Anthony J. Tawa, Jr.

Phone \_\_\_\_\_

Date Shipped \_\_\_\_\_

Airbill No. \_\_\_\_\_

Carrier \_\_\_\_\_

Cooler No. \_\_\_\_\_

## SHIP TO:

Enseco-ERCO Lab  
205 Alewife Brook Parkway  
Cambridge, MA 02138  
(617) 661-3111

ATTENTION:

Clyde Treaster

## SEND RESULTS TO:

Client Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_

See Page 1PROJECT NAME MBTA: JFK/UMass Demol. PROJECT NO. 8730 C P.O. NO. \_\_\_\_\_

Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Received at lab by: (Signature)	Date	Time
Relinquished from lab by: (Signature)	Received by: (Signature)	Date	Time

## ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time Sampled	Analysis Requested	Sample Condition Upon Receipt
PMW-3, Ag-1	Aqueous	5-14-88/155	PHIR (1 bottle) ✓	
PMW-3, Ag-1	"	"	Purgeable Aromatics (3 vials) (EPA 602) ✓	
PMW-3, Ag-1	"	"	O.G. (1 bottle) ✓	
PMW-4, Ag-1	Aqueous	5-14-88/125	PHIR (1 bottle) ✓	
PMW-4, Ag-1	"	"	Purgeable Aromatics (3 vials) (EPA 602) ✓	
PMW-4, Ag-1	"	"	O.G. (1 bottle) ✓	

## Special Instructions/Comments:

Samples collected beginning on 21<sup>st</sup> bailing for each well.

NOTE: UNUSED PORTIONS OF NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Expected

Analytical

Immediate

T.A.T's:

Attention (200% surcharge)

RUSH (50-100% surcharge)

Standard ✓

ERCO Booking Log Number: (for lab use only)

ERCO A Division of ENSECO Incorporated

205 Alewife Brook Parkway, Cambridge, Massachusetts 02138

CONFIRMATION OF SAMPLES RECEIVED

THIS IS NOT AN INVOICE. IT IS A CONFIRMATION OF SAMPLE RECEIPT AND PRICE ONLY

TO: ANTHONY J. TAWA

Sverdrup Corporation  
38 Chauncy St.  
Boston, MA 02111

PROJECT: 8730C

PROGRAM:

DUE DATE: 6/06/1988

DATE OF SAMPLE RECEIPT: 5/16/1988

NO. OF SAMPLES: 20

TODAY'S DATE: 05/27/1988

ACCOUNT NO./BOOKING LOG NO: 925101/7865

YOUR PURCHASE ORDER NO:

Analyses Requested By: Sverdrup Corporation  
38 Chauncy St.  
Boston, MA 02111

ERCO MANAGER: Clyde Tressler

SAMPLE ID	CLIENT ID	MATRIX	ANALYSIS	PRICE
88 -786501	PMW-1,Ag-1	AQUEOUS	Gravimetric Oil & Grease	\$45.00
			Pet. Hydrocarbons by IR	75.00
			EPA Method 602	100.00
88 -786502	PMW-2,Ag-1	AQUEOUS	Gravimetric Oil & Grease	45.00
			Pet. Hydrocarbons by IR	75.00
			EPA Method 602	100.00
88 -786503	PMW-3,Ag-1	AQUEOUS	Gravimetric Oil & Grease	45.00
			Pet. Hydrocarbons by IR	75.00
			EPA Method 602	100.00
88 -786504	PMW-4,Ag-1	AQUEOUS	Gravimetric Oil & Grease	45.00
			Pet. Hydrocarbons by IR	75.00
			EPA Method 602	100.00
88 -786505	PMW-1,S-1	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786506	PMW-1,S-2	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786507	PMW-1,S-3	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786508	PMW-1,S-4	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786509	PMW-2,S-1	SOLID	Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786510	PMW-2,S-2	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00



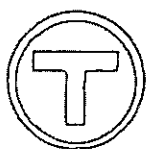
88 -786511	PMW-2,S-3	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786512	PMW-2,S-4	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786513	PMW-3,S-1	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786514	PMW-3,S-2	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786515	PMW-3,S-3	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786516	PMW-3,S-4	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786517	PMW-4,S-1	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786518	PMW-4,S-2	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786519	PMW-4,S-3	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00
88 -786520	PMW-4,S-4	SOLID	Gravimetric Oil & Grease	55.00
			Pet. Hydrocarbons by IR	85.00
			EPA Method 8020	120.00

TOTAL AMOUNT OF ORDER: \$ 4985.00

ERCO Manager Approval:

*Clyde Tramm*

pd:<880527.1430>



**MASSACHUSETTS  
BAY  
TRANSPORTATION  
AUTHORITY**

Regional Construction Office  
Cabot Yard  
275 Dorchester Avenue  
South Boston, MA 02127

722 - 5233

722 - 5234

February 27, 1989

Ms. Iris W. Davis  
Massachusetts Department of Environmental  
Quality Engineering  
Metropolitan Boston - Northeast Region  
5 Commonwealth Avenue  
Boston, Massachusetts 01801

RE: DEQE Case No. 3-364  
MBTA Contract No. S3CN07 - Demolition, JFK/UMass Station  
Summary Report of Hazardous Waste Remediation at  
JFK/UMass Station and Request for Delisting

During the past four years, the MBTA has performed significant investigatory and remedial activities at the former Harry Butter Property acquired as part of the JFK/UMass Station Modernization. This letter report summarizes those activities and requests favorable Department (DEQE) action in classifying remediation at this site as completed.

During preliminary planning to expand the service at JFK/UMass Station, the Massachusetts Bay Transportation Authority (MBTA) initiated a property assessment of a parcel of land known as the Harry Butter Property adjacent to the station. This was undertaken because of the past use of the property as a brass and bronze foundry. The initial study performed in 1985 revealed a number of items of environmental concern.

Previous investigations identified the only significant surface contamination was from lead. The contamination levels inside all surface structures, and in the water and sludge remaining on site, were at elevated levels. Samples from miscellaneous drums scattered about the site indicated a few contained hazardous materials. Subsurface sampling identified high bulk lead concentrations, and volatile organic compounds were found in two locations but were absent in the ground water at those locations. Further investigation and testing of samples from the site, resulted in development of a Hazardous Waste Remediation Plan by Sverdrup Corporation, the MBTA's consulting engineer. This remediation plan was DEQE-approved by letter dated July 13, 1987 from the Department's Deputy Regional Environmental Engineer.

Ms. Iris W. Davis  
Page 2

Remediation of the site was to be carried out concurrently with demolition and removal of existing site structures. The objective of that work was to render the site non-hazardous to human health and the environment, and to prepare it for productive use and development by the MBTA.

A contract was awarded by the MBTA to O'Rourke Construction Co., Inc. in July 1987 to carry out the demolition and site remediation. The work was to be done in accordance with the Project Specification incorporating the Remediation Plan as developed and monitored by Sverdrup Corp., with a full time Resident Engineer on the jobsite. Field work commenced in August 1987.

A personnel decontamination trailer was set up on site August 10, 1987 for decontamination of the site workers. A Certified Industrial Hygienist (CIH) was contracted by O'Rourke Construction to set up and implement a site health and safety plan for the protection of employees. Heavy duty vacuuming of the surface of all structures and the paved ground surface was performed immediately prior to the start of demolition in order to reduce the airborne contamination that might have been created by demolition activities. The collected material was deposited by the vacuum loader in a secure, sheltered shed for subsequent on-site handling by chemical stabilization. Monitoring stations at the perimeter of the property were maintained in order to test for airborne contamination leaving the property. No significant increase was detected during the course of the project.

Demolition work commenced on August 17 with the chimney at the south end of the site being brought down by a crane equipped with a clamshell bucket. Chimney brick was lowered to grade level on site and left at the base of the chimney, for later disposal as hazardous waste.

Building demolition commenced on August 19. As each building was demolished, the sheet metal, structural steel, and other construction materials were high pressure washed; the wash water was collected and contained on-site for subsequent utilization in the chemical stabilization process. Test samples were taken on the surface of the materials and sent to a laboratory for analysis. All products of demolition were set aside in a "clean area" until test results certified they were free of contamination. They were then disposed of as common refuse.

O'Rourke Construction contracted with Clean Harbors of Braintree for disposal of miscellaneous items from the site that could not be cleaned or otherwise rendered non-hazardous. On August 28 and September 8, a total of 76 cy of contaminated chimney rubble and furnace brick were trucked from the site by a licensed hazardous waste hauler. On September 10, four drums of hazardous liquid and one bag of asbestos insulation were overpacked and removed. On September 16, and October 6, a total of four underground tanks were transported to an approved tank yard under permit from the Boston Fire Department. Prior to transport, diesel fuel (1250 gal) and gasoline (150 gal) were pumped from the tanks and manifested separately. During removal of these tanks, observations made did not indicate any leaks, odors, or stained soil.

Examination of the extent of subsurface contamination started on August 26, and was done by taking samples at one foot intervals of depth from soil borings. The borings were placed on a grid of approximately 50 foot centers and other areas of suspected contamination. The boring samples were sent to a state certified laboratory for testing for bulk lead content, and a portion of each sample was retained for an EP Toxicity test. Subsurface material was to be excavated to a depth at which the bulk lead content was 500 ppm or less, and also non-EP toxic. A contour map was developed for the excavation. When the excavation was completed to the contours, additional soil samples were taken at 25 locations offset from the original borings. These samples were used to verify that the lead level at the excavated elevation was non-EP toxic. Over two-thirds of these initial verification samples exhibited EP Toxicity values for lead of less than 5.0 mg/l, and only two of the eight verification samples failing the EP Toxicity test had bulk lead concentrations greater than 500 ppm. Nonetheless, significant additional soil excavation and disposal was performed in those areas surrounding the eight initial verification samples that failed the EP Toxicity test to further reduce the amount of any residual lead in the soil remaining at the site prior to backfilling with clean fill.

O'Rourke Construction contracted with Chemfix Technologies, Inc. of Metairie, La. to provide a chemical stabilization process for on-site treatment of the excavated soil. The chemical reactions of the treatment were to produce a chemically and physically stable material. Through laboratory testing, the resulting product was to be verified as non-hazardous and environmentally stable, so that it could be disposed of as a special waste in a landfill. Chemfix started moving their equipment on-site August 29.

Ms. Iris W. Davis  
Page 4

Chemfix encountered problems from the onset in handling the soil with their equipment. By October 13, after continually experimenting with, and modifying their equipment, it was concluded that Chemfix could not effectively perform the work. The end products were bulking up, which created a greater handling and disposal problem. Most importantly, the majority of the material passed through the treatment process, was failing the toxicity test. During this period, all vacuum-collected materials and wash waters from earlier on-site remediation activities were fed to the Chemfix equipment and became part of the product output. Chemfix then removed their equipment from the site. Previously, September 25 and 28, a total of 76 cubic yards of successfully treated and tested soil were trucked from the site. These were the only two shipments of treated soil.

On October 14, two truckloads (40 c.y.) of contaminated soil were shipped to Stablix Canada, Inc. (Blainville, Quebec, Canada). After an unsuccessful attempt to treat the first truckload, the second load was returned to the site.

O'Rourke Construction Co. then decided that no further attempts at treatment of the soil would be made. SCA Chemical Services (Model City, N.Y.) was contracted to receive the soil. From October 20 to November 5, approximately 3350 cubic yards of contaminated soil including unsuccessfully treated products from the chemical stabilization process, was excavated and shipped to SCA Chemical Services. During excavation of the soil at the deepest portion of the contour (approximately 10-feet below the former grade), indications of hydrocarbon-based contamination were observed. Subsequent activities performed in this regard are provided as an attachment to this letter, and the MBTA solicits DEQE's concurrence with the conclusions of the attachment.

Starting on October 29, clean backfill was brought to the site to return it to the desired elevation. A total of 6628 cubic yards of sand was spread and compacted by November 11, 1987. This completed the on-site contractual obligation of O'Rourke Construction Company.

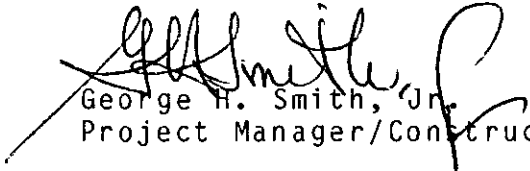
In light of the above, the MBTA believes it has appropriately and completely performed all assessment and remedial actions warranted at this site. As a result of these ameliorative activities, the site no longer is believed to pose a significant risk of harm to health, safety, public welfare, or the

Ms. Iris W. Davis  
Page 5

environment. Therefore, the MBTA respectfully requests that DEQE remove the subject site from the Department's "confirmed" list of sites requiring or experiencing remedial response actions.

If you have any questions on the above, or require additional information, please do not hesitate to contact me.

Very truly yours,



George H. Smith, Jr.  
Project Manager/Construction

GHS/cmd

Attachments

cc: Arnold L. Shorrock, Sverdrup Corp.

## DISCUSSION OF POST-REMEDATION MONITORING PROGRAM

As noted in the body of the associated letter report, during excavation of soil at the deepest portion of the lead contaminated soil contour; indications of hydrocarbon-based contamination of unknown origin was observed. The MBTA immediately notified DEQE of this occurrence by letter on November 5, 1987. Subsequently, based on correspondence with DEQE and a meeting on March 8, 1988, a monitoring program to achieve a better understanding if possible of the source and extent of the contamination was developed. Initial monitoring activities have been completed, and are reported herein. The location of the installed monitoring wells are presented in Figure 1.

Based on weekly measurements over a six-week period at the four monitoring wells installed, the groundwater flow appears, as theorized, to trend southerly and easterly across the site in an inconsistent manner. In all six instances, MW-3 had the highest groundwater elevation. In three instances MW-4, MW-1 and MW-2 exhibited sequentially lower groundwater elevations respectively, while in the three other instances the decreasing groundwater elevation sequence was MW-2, MW-4 and MW-1.

Four soil samples were collected from each boring and a groundwater sample was obtained from each established monitoring well. Each sample was analyzed for total oil and grease, total petroleum hydrocarbon, and aromatic volatile organics at a certified laboratory (Enseco). Also hydrocarbon fingerprinting using the U.S. Coast Guard Oil Spill Identification System was performed on the groundwater sample and the soil sample exhibiting the highest total petroleum hydrocarbon concentration. The analytical results are presented in Table 1.

As can be seen by reference to Table 1, indications of minor petroleum contamination are present in nearly all 16 soil samples at all depths. This indication of ubiquitous low-level presence is reinforced by the fact that the four soil samples exhibiting the highest total petroleum hydrocarbon concentrations were distributed among each of the four borings. Not only was an inconclusive area/distribution observed, but the depths at which these highest oil and grease and total petroleum hydrocarbon concentrations were located varied as well among the borings. In addition, only one sample exhibited the presence of any aromatic volatile organics; inexplicably this sample had among the lowest concentrations of oil and grease and total petroleum hydrocarbons observed in any of the samples.

The only groundwater sample exhibiting any total petroleum hydrocarbon contamination was from MW-1 which is located immediately adjacent to Mt. Vernon Street. The hydrocarbon fingerprint of this sample indicates that the source of contamination is lubricating oil; there is no evidence that lubricating oil was ever used, stored or disposed of at the site. This factor, coupled with the analytical results for the soil samples as discussed above, suggest that the low levels of petroleum-based contamination observed may be migrating onto the site from the north under Mt. Vernon Street.

Based on the above, it appears that there is a pervasive presence at the site of indeterminate source petroleum contamination; this contamination is present at relatively low levels. Additional monitoring within the site boundaries is unlikely to provide additional useful information regarding the source or sources of this contamination, and, in light of the diffuse and relatively minor contamination present, further activities at this site do not appear warranted or appropriate.



TABLE 1. POST-REMEDIATION ANALYTICAL RESULTS

Location	Sample	<u>Pollutant Concentrations</u>		
		<u>Total Oil &amp; Grease (mg/g)*</u>	<u>Total Petroleum Hydrocarbon (ug/g)*</u>	<u>Aromatic Volatile Organics (ug/kg)</u>
MW-1	Soil, 0'-2'	0.31	1,400	ND-all
MW-1	Soil, 5'-7**	5.5	3,100	ND-all
MW-1	Soil, 10'-12'	0.78	120	ND-all
MW-1	Soil, 15'-17'	ND	28	ND-all
MW-2	Soil, 0'-2'	No Sample	140	ND-all
MW-2	Soil, 5'-7'		40	***
MW-2	Soil, 10'-12'		84	ND-all
MW-2	Soil, 15'-17'		97	ND-all
MW-3	Soil, 0'-2'	0.15	68	ND-all
MW-3	Soil, 5'-7'	0.51	ND	ND-all
MW-3	Soil, 10'-12'	1.0	310	ND-all
MW-3	Soil, 15'-17'	ND	32	ND-all
MW-4	Soil, 0'-2'	0.85	240	ND-all
MW-4	Soil, 5'-7'	0.29	55	ND-all
MW-4	Soil, 10'-12'	0.49	39	ND-all
MW-4	Soil, 15'-17'	ND	ND	ND-all
MW-1	Groundwater**	51	3.3	ND-all
MW-2	Groundwater	1.2	ND	ND-all
MW-3	Groundwater	ND	ND	ND-all
MW-4	Groundwater	2.8	ND	ND-all

\*Groundwater sample concentrations are mg/l.

\*\*Hydrocarbon fingerprinting performed with following qualitative identification reported by the analytical laboratory: "This sample has GC/FID characteristics that are similar to lubricating oil."

\*\*\*Chlorobenzene detected at 1200 ug/kg. No other aromatic volatile organics detected in this sample.

MBTA CONTRACT NO. S3CN07  
DEMOLITION - JFK/UMASS STATION

POST-REMEDATION MONITORING

NOTES

1. T-1, T-2, and T-3 refer to subsurface fuel tanks removed during site remediation. O-1, O-2, and O-3 refer to locations where subsurface hydrocarbon contamination was observed during site remediation.
2. Installed monitoring well locations/designations.



Drawn by J. E. FRAPPYER / A. J. TAWA, JR.

Date 2/15/89

Scale 1" = 20'

8730 C

**Sverdrup**

V-1  
Elev  
119.22

MW-4  
Elev  
119.42

O-2

MW-2

(Relative To Station Modernization Construction)



**MASSACHUSETTS  
BAY  
TRANSPORTATION  
AUTHORITY**

Regional Construction Office  
Cabot Yard  
275 Dorchester Avenue  
South Boston, MA 02127

March 16, 1988

Massachusetts Department of  
Environmental Quality Engineering  
Metropolitan Boston-Northeast Region  
5 Commonwealth Avenue  
Woburn, Massachusetts 01801

ATTENTION: Ms. Iris W. Davis

RE: M.B.T.A. Contract No. S3CN07, Demolition JFK/UMass Station

Dear Ms. Davis:

With reference to our meeting of Tuesday, March 8, 1988 regarding additional information of the above referenced project, the MBTA has revised the course of action developed to define the nature and degree of such contamination previously submitted. This letter presents the key aspects of the proposed monitoring and analytical effort.

The proposed monitoring program will be a two-step process. The initial phase will be used to determine the direction of the ground water flow across the site. The soil and ground water samples will be analyzed for contamination of petroleum products. Upon analysis of the initial samples and identification of ground water flow, a second set of monitoring wells will be installed to locate and quantify the petroleum contamination. The monitoring wells installed during the second phase will be located in the vicinity of the petroleum contamination identified during the recently completed site remediation, in the vicinity of the location of the underground storage tank also removed during the recently completed site remediation, and in such a manner to assist in locating the contamination. Figure 1 (attached) presents the location of the planned/current JFK/UMASS station modernization along with the proposed monitoring well locations for the initial phase.

Each monitoring well will be installed to a depth of approximately fifteen feet or a minimum of 5 feet below the existing ground water elevation. Figure 2 (attached) presents a typical monitoring well installation. Four soil samples will be collected from each boring and submitted to a DEQE state certified laboratory for analysis. The following analysis will be performed on both soil and ground water samples:

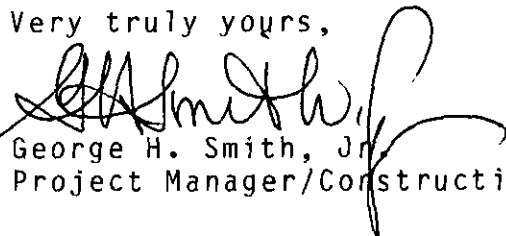
Total Oil and Grease  
Total petroleum hydrocarbon (TPH) 418.1 IR  
Volatile organics - SW 8020 (soil)  
Purgeable aromatics - EPA 602 (ground water)

The monitoring wells will be monitored on the day of installation, twice during the first week and a final time during the second week. Additional monitoring may occur if deemed necessary.

As indicated in our meeting we will be proceeding with the installation of these wells and performances of the analytical work in early April 1988 unless otherwise directed by DEQE. Upon completion of the initial phase we will be in contact with you to report our results and to discuss the proposed program for the second phase.

If you have any questions, do not hesitate to contact me at 722-5233 or James A. Pappas 482-7880, at Sverdrup Corporation. Again thank you for the time you afforded us on Tuesday, March 8, 1988.

Very truly yours,

  
George H. Smith, Jr.  
Project Manager/Construction

GHS/JAP/cmd

cc: A. L. Shorrock (S&P) w/att.  
J. A. Pappas " " " "

TELEPHONE LOG

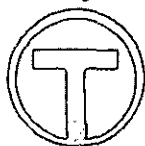
FROM: Lris Davis REPRESENTING: DEQE PHONE#: \_\_\_\_\_  
TO: George Smith REPRESENTING: M BTA PHONE#: 722-5593

SITE REFERENCE: DFK/UMASS Station DATE: 1-26-88 TIME: 11:35

SUBJECT: Sub surface Oil Contamination

DISCUSSION NOTES: Mr. Smith has not returned my calls Today  
I left a message that wells should not be drilled, and  
he should call me to talk about the proposal.

ACTION PROPOSED/ REQUIRED/REFERRED TO: \_\_\_\_\_



**MASSACHUSETTS  
BAY  
TRANSPORTATION  
AUTHORITY**

Regional Construction Office  
Cabot Yard  
275 Dorchester Avenue  
South Boston, MA 02127

January 7, 1988

Ms. Iris W. Davis  
M.D.E.Q.E.  
Metropolitan Boston-Northeast Region  
5 Commonwealth Ave.  
Woburn, MA 01801

Re: MBTA Contract No. S3CN07  
Demolition JFK/UMass Station  
Proposed Investigation of Potential  
Subsurface Oil Contamination

Dear Ms. Davis:

In response to your request to provide additional information regarding potential subsurface oil contamination at the subject site, the Authority has developed a course of action to define the nature and degree of such contamination. This letter presents the key aspects of a proposed monitoring effort to develop such information.

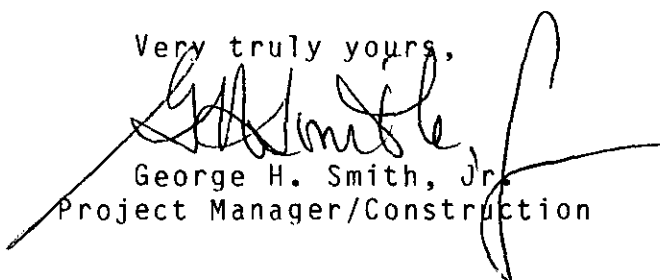
Figure 1 (attached) presents the location of planned/current JFK/UMass station modernization construction on the former Butter site. The locations where the possibility of subsurface petroleum contamination were detected during the recently completed site remediation, together with the locations of the removed underground fuel tanks are also identified. Against this backdrop, the proposed location of eight monitoring wells recommended for installation are shown. In locating these proposed wells, identified as PMW-1 through PMW-8 on the attached Figure 1, an attempt has been made to minimize interference with pipeline and pedestrian bridge/ramp construction while still achieving the objectives stated above.

Each monitoring well will be installed to a depth of approximately fifteen (15') feet or a minimum of five (5') feet below the groundwater elevation. Four (4) soil samples will be collected from each boring and submitted to a state certified laboratory for analysis. After the monitoring wells have been established, groundwater samples will be obtained and analyzed. The following analyses will be performed on both the soil and groundwater samples:

Total oil and grease — *no*  
Total hydrocarbon scan — *what*  
Aromatic volatile organics-SW 8020 (soil) or  
Purgeable aromatics-EPA 602 (groundwater)

Unless otherwise directed by DEQE, the Authority will arrange for installation of the proposed monitoring wells during the period late January/early February. If you require additional information, or have any questions, please call.

Very truly yours,



George H. Smith, Jr.  
Project Manager/Construction

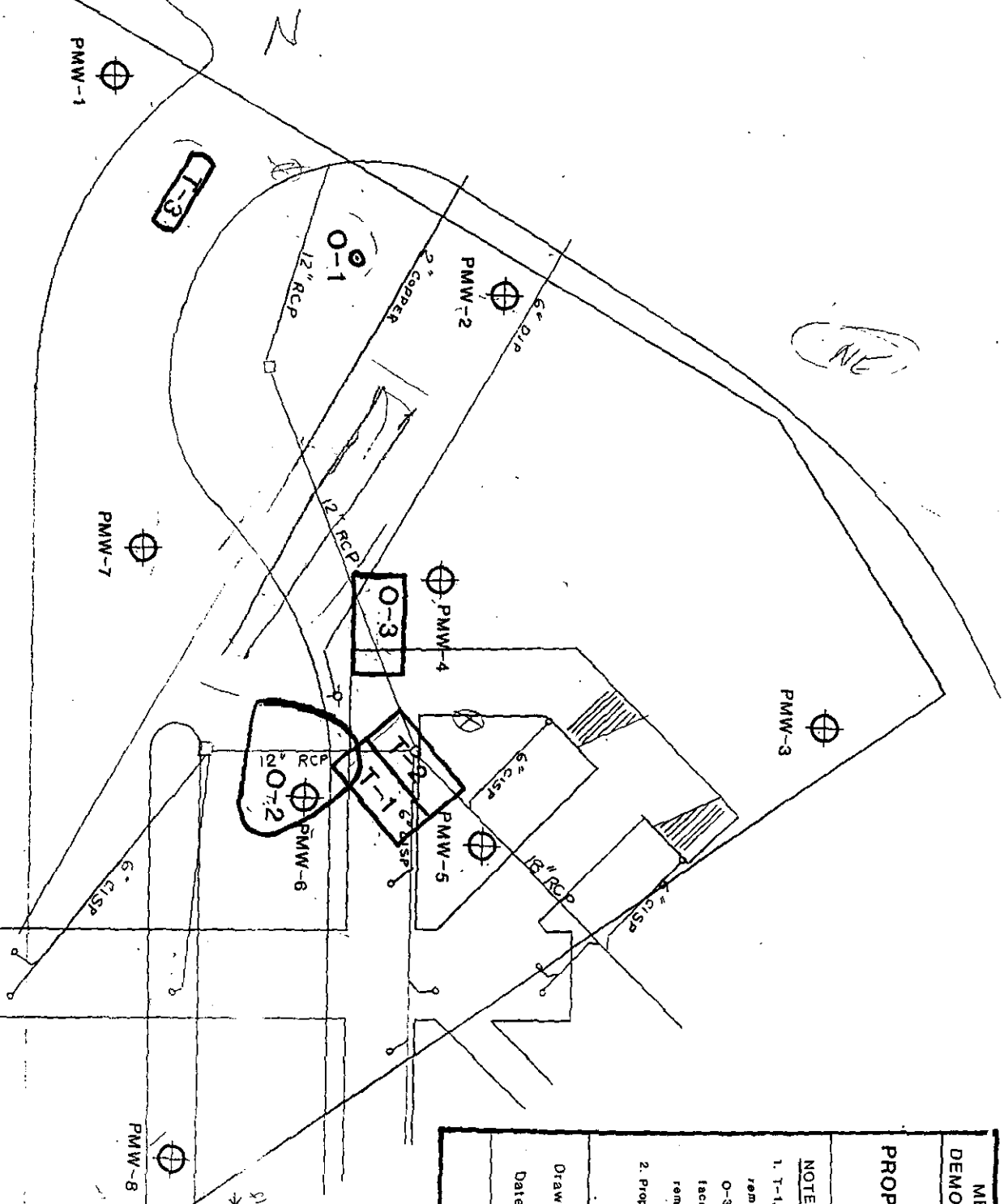
GHS/kp

cc: A. L. Shorrock - S & P (w/att)  
J. Pappas - S & P (w/att)

Sheet

NE

FIGURE 1. PROPOSED MONITORING WELL LOCATIONS (Relative To Station Modernization Construction)



MBTA CONTRACT NO. S3CN07  
DEMOLITION - JFK/UMASS STATION

PROPOSED MONITORING WELLS

NOTES

1. T-1, T-2, and T-3 refer to subsurface fuel tanks removed during site remediation. O-1, O-2, and O-3 refer to locations where potential subsurface oil contamination was observed during site remediation.
2. Proposed monitoring well locations/designations.

Drawn by J. E. FORTER / A. J. TAYLOR  
Date 12/15/01 Scale 1" = 20'  
**Sverdrup**  
8730 C



Date 11-1-88 Region 1 Case No. 100-100

**DEQE OIL AND HAZARDOUS MATERIAL SPILL/RELEASE INCIDENT  
INSPECTION REPORT**

1. INITIAL FIELD RESPONSE ☐ TELEPHONE RESPONSE ☒ FOLLOW-UP RESPONSE ☐
2. MUNICIPALITY: Weymouth
3. ADDRESS: 1000 Weymouth Ave. Weymouth, MA 01981
4. INCIDENT 1ST REPORTED: Date 10/27/88 Time 1:00 A.M./P.M.
5. INCIDENT OCCURRED: Date 10/27/88 Time 1:00 A.M./P.M.
6. PERSON WHO 1ST NOTIFIED DEQE:  
Name John J. Ryan Title Manager  
Address 1000 Weymouth Ave. Weymouth, MA 01981 Tel. # 781-326-1000
7. OIL OR HAZARDOUS MATERIAL RELEASED:  
a. Name: Weymouth b. Amount Reported: 1000 Actual: 1000  
c. Source: (Circle appropriate item) ☒ tanker truck ☐ vessel ☐ railroad  
☐ above-ground tank ☐ below-ground tank ☐ pipe ☐ hose ☐ other  
d. Samples Obtained: Yes ☐ No ☒ e. Drums Retained: Yes ☐ No ☒
8. BRIEF DESCRIPTION OF INCIDENT: Oil spill from tanker truck
9. SPILL/RELEASE SOURCE IDENTIFIED: Yes ☐ No ☒ 10. IMPACT TO SURFACE WATERS: Yes ☐ No ☒
11. POTENTIALLY RESPONSIBLE PERSON IDENTIFIED BY DEQE:  
a. Name John J. Ryan Tel. # 781-326-1000 Agent John J. Ryan Tel. # 781-326-1000  
Address 1000 Weymouth Ave. Weymouth, MA 01981  
b. Responsible person received Verbal Notice of Responsibility accompanied by Written Synopsis of MGL c. 21E: Yes ☐ No ☒ Date 10/27/88 Time 1:00 A.M./P.M.  
c. Responsibility accepted and proper actions taken by responsible person: Yes ☐ No ☒  
d. Name of cleanup contractor hired by responsible person: Weymouth Dept. of Public Works
12. REGIONAL RESPONSE ACTIONS:  
a. State-cleanup contractor hired by DEQE: Yes ☐ No ☒  
b. Contractor arrived on-scene: Date 10/27/88 Time 1:00 A.M./P.M.  
c. Further field response actions needed: Yes ☐ No ☒  
d. Enforcement actions taken/recommended: Yes ☐ No ☒ (if yes, specify) None  
e. Case closed ☒ Case pends ☐
13. BOSTON OFFICE RESPONSE ACTIONS:  
a. Cost recovery recommended: Yes ☐ No ☒ Maybe ☐  
b. Enforcement action(s) recommended: Yes ☐ No ☒ (if yes, specify) None
14. INTRA-AGENCY NOTIFICATION:  
a. Name of DEQE employee 1st notified: John J. Ryan  
b. Name(s) of other DEQE employee(s) notified: None
15. OTHER AGENCIES NOTIFIED BY DEQE OF SPILL/RELEASE INCIDENT:  
Name: None Name: None

Report prepared by: John J. Ryan  
Signature \_\_\_\_\_ Title \_\_\_\_\_



S. RUSSELL SYLVA  
Commissioner  
935-2160

# *The Commonwealth of Massachusetts*

*Department of Environmental Quality Engineering  
Metropolitan Boston - Northeast Region*

*5 Commonwealth Avenue  
Woburn, Massachusetts 01801*

September 2, 1987

William Simmons  
N.E. Environmental Technologies  
310 Main Street  
Groveland, MA 01834

RE: BOSTON/DORCHESTER - Solid Wastes  
UMASS Modernization Project  
DEQE Case No. 3-364

Dear Mr. Simmons:

This letter per your request will clarify this Office's August 18, 1987 letter concerning the classification of "Chemifixed" lead contaminated soils. That letter was unclear as to whether the soils should be classified as a special waste or solid waste.

The intent of the August 18, 1987 letter was to categorize the soil as solid waste and not require a special disposal location in the sanitary landfill nor require special handling. In fact, the Department encourages the use of these soils as daily cover in order to not deplete existing landfill capacity. However the Department requires that the local Board of Health approval be granted prior to the final disposition of the subject "Chemifixed" soils into an approved sanitary landfill as stated in the August 18, 1987 letter from this office.

If you have any questions or desire additional information please call Joel Hartley at the above telephone number.

Very truly yours,

*Joel D. Hartley P.E. for*

Richard J. Chalpin  
Deputy Regional  
Environmental Engineer

RJC/JH/ae

cc: Mr. Robert W. Hirsch, Chem Fix Technologies, Inc., 2424 Edenborn Ave.,  
Suite 620, Metairie, LA 70001  
DEQE, DSW, One Winter St., Boston, MA 02108  
BOH, City Hall, Peabody, MA 01960  
Site Assessment, Northeast Region



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION I**

**J. F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203**

August 20, 1987

Michael S. Hudson, ES III  
Division of Licensing & Enforcement  
Bureau of Oil & Hazardous Materials Control  
Maine Department of Environmental Protection  
State House Station #17  
Augusta, Maine 04333

Dear Mr. Hudson:

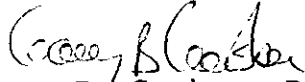
In response to your recent inquiries regarding the applicability of the Federal RCRA regulations to hazardous waste treatment activities conducted under the Massachusetts statute Chapter 21(e), I offer the following guidance.

The Massachusetts Department of Environmental Quality Engineering (DEQE) received final authorization under RCRA to administer its hazardous waste program. The State received this authorization effective February 7, 1985. The Legislature incorporated appropriate provisions into their hazardous waste statutes and DEQE promulgated regulations in order to implement a hazardous waste management program equivalent and consistent with the Federal program. State regulations promulgated under the authority of Chapter 21(c) are applicable at facilities that treat, store, or dispose of hazardous waste. As such, further inquiry regarding the matter of permitting for on-site treatment of contaminated soils as you described in your June letter should be referred directly to the DEQE. I would recommend that you contact Mr. Steven Dreeszen, Chief, Licensing Branch, Division of Hazardous Waste, One Winter Street, Boston, MA 02108, (617) 292-5832, regarding this matter.

On November 8, 1984, President Reagan signed into law the Hazardous and Solid Waste Amendments (HSWA) of 1984. Currently, DEQE is not authorized for any requirement which implements the HSWA. EPA is directed to carry out the requirements and prohibitions of these amendments until Massachusetts is authorized to do so.

Please feel free to contact me at your convenience if additional questions or comments arise regarding this matter at (617) 223-3468.

Sincerely,



Gary B. Gosbee, P.E., Chief  
MA Waste Regulation Section

Enclosure

cc: Steven Dreeszen, DEQE  
Iris Davis, DEQE  
Joel Blumstein, EPA-ORC  
Joel Balmat, EPA



S. RUSSELL SYLVA  
Commissioner  
935-2160

*The Commonwealth of Massachusetts*  
*Department of Environmental Quality Engineering*  
*Metropolitan Boston - Northeast Region*  
*5 Commonwealth Avenue*  
*Webster, Massachusetts 01801*

August 18, 1987

Mr. Robert W. Hirsch  
Chem Fix Technologies, Inc.  
2424 Edenborn Avenue, Suite 620  
Metairie, LA 70001

RE: BOSTON/DORCHESTER - UMASS  
Modernization Project  
DEQE Case No. 3-364

Dear Mr. Hirsch:

The Massachusetts Department of Environmental Quality Engineering (the Department), Northeast Regional Office, has reviewed a plan of remedial action concerning the JFK/UMASS Modernization Project in Dorchester, MA. Based upon information submitted by Sverdrup, Corp., concerning this site, the Department has determined that soils treated by the Chemfix process may be conditionally classified as solid waste in accordance with 310 CMR 19.00, the solid waste regulations. After the Chemfix treatment, this material falls into the category of solid waste as defined in 310 CMR 19.16 (Special Waste).

The local assigning agency for a landfill where the waste is to be deposited must give permission for the landfill to receive the waste. In addition, should the landfill be in another region of the Department, you must first inform the appropriate Regional Office within the Department of the landfill which intends to receive the waste, to insure that the facility is operating in compliance with Departmental regulations.

No licensure is required for the treatment of the contaminated soil under CMR 30.801(1) in the Massachusetts Hazardous Waste Regulations as the treatment will be conducted as part of an overall site remediation plan.

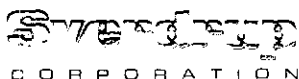
If you have any questions please contact Iris Davis at the letterhead address or 935-2160. All future communications regarding this site must reference the DEQE Case Number designated in the subject heading.

Very truly yours,

*Richard J. Chapin*  
Richard J. Chapin  
Deputy Regional  
Environmental Engineer

RJC/ID/ae

cc: DEQE, DHW, 1 Winter St., Boston, MA 02108, Attn: Madeline Snow  
Sverdrup, Corp., Chauncy St., Boston, MA  
New England Environmental Tech., Corp., 310 Main St., Groveland, MA 01834  
Kenneth Young, Wiles & Furth, Central Plaza, August, ME



38 Chauncy Street  
Boston, Massachusetts 02111

617 482-7880

JR15

August 4, 1987

Mr. Richard J. Chalpin  
Deputy Regional Environmental Engineer  
Department of Environmental  
Quality Engineering  
Northeast Region  
Five Commonwealth Avenue  
Woburn, MA 01801

SUBJECT: Boston/Dorchester  
UMASS Modernization Project  
DEQE Case No. 3-364

Dear Mr. Chalpin:

As per your letter of July 13, 1987, we are forwarding copies of the Sverdrup Health and Safety Plan for the Sverdrup employees that will be on-site (see enclosure #1). O'Rourke Construction Co.'s (the General Contractor) Health and Safety Plan for his employees is also included (see enclosure #2).

Very truly yours,

SVERDRUP CORPORATION

A handwritten signature in cursive script, appearing to read "James A. Pappas".

James A. Pappas  
Chief Environmental Engineer

JEF:AMC

Enclosures

cc: George H. Smith, Jr. - MBTA



S. RUSSELL SYLVA  
Commissioner  
935-2160

*The Commonwealth of Massachusetts*  
*Department of Environmental Quality Engineering*  
*Metropolitan Boston - Northeast Region*  
*5 Commonwealth Avenue*  
*Woburn, Massachusetts 01801*

July 13, 1987

Mr. James A. Pappas  
Chief Environmental Engineer  
Sverdrup Corporation  
38 Chauncy Street  
Boston, MA 02111

RE: BOSTON/DORCHESTER  
UMASS Modernization Project  
DEQE Case No. 3 - 364

Dear Mr. Pappas:

This letter is to confirm the status of the JFK/UMASS Modernization Project. The Department of Environmental Quality Engineering (the Department) is in receipt of your letter dated May 4, 1987 regarding further information required by the Department prior to commencing remediation work on the subject site.

After reviewing the plan and the "Chem-fix" method to be used on the site, the Department approves of the remediation plan for the JFK/UMASS Modernization Project. However, the health and safety plan for the site must be submitted to the Department for both the general contractor's employees as well as Sverdrup employees who will be on site.

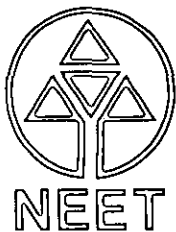
Please notify Iris Davis at the letterhead address or 935-2160 when work on the site begins, or if you have any further questions regarding this matter. All future communications regarding this site must reference the DEQE Case Number designated in the subject heading.

Very truly yours,

Richard J. Chalpin  
Deputy Regional  
Environmental Engineer

RJC/ID/ae

cc: DEQE, DHW, 1 Winter St., Boston, MA 02108, Attn: Madeline Snow  
Mr. Mike Hudson, Dept. of Environmental Protection, Bureau of  
Hazardous Materials, Station 17, Augusta, ME 04331



New  
England  
Environmental  
Technologies,  
Corporation

July 1, 1987  
re: U Mass/JFK Project

Ms. Iris Davis  
MDEQE  
Northeast/Metro Regional Office  
5 Commonwealth Ave.  
Woburn, MA. 01801

Dear Ms. Davis,

As a follow up to our phone conversation today, I have enclosed:

- (a) A QA/QC procedure to be followed
- (b) Analytical results showing E.P. Toxicity data pre and post Chemfix Treatment
- (c) A copy of the letter from Michael Hudson, Maine DEP to Wiles & Furth

I have taken the liberty of drafting a letter which I believe addresses the concerns expressed in Mr. Hudson's correspondence. I also believe that the draft accurately sets forth DEQE position and does not overly commit the Department.

If you concur with this draft, I would appreciate your having it signed off as soon as possible. Please feel free to make any editorial changes you may feel are appropriate.

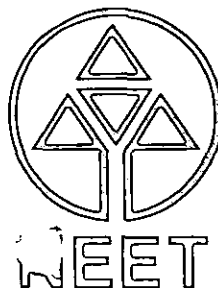
Thank you for your time and assistance in this matter.

Very truly yours,

William A. Simmons  
Principal

cc:  
Ken Young, Wiles & Furth  
CTA, Metairie, La.

RECEIVED  
JUL 2 1987  
Northeast Region  
DEQE



310 Main Street  
Groveland, MA 01834  
(617) 521-1111

William A. Simmons  
PRINCIPAL

New  
England  
Environmental  
Technologies,  
Corporation





STATE OF MAINE

# Department of Environmental Protection

MAIN OFFICE: RAY BUILDING, HOSPITAL STREET, AUGUSTA  
MAIL ADDRESS: State House Station 17, Augusta, 04333

JOHN R. McKERNAN, JR.  
GOVERNOR  
June 10, 1987

DEAN C. MARRIOTT  
COMMISSIONER

Kenneth C. Young  
Two Central Plaza  
Augusta, ME 04330

Dear Ken:

Please find enclosed the material that you presented during our meeting of May 29, 1987. At your suggestion, I photocopied the material for the Department's use in any technical review that may be necessary.

At this time I am awaiting a reply from Gary Gosbee, U.S. EPA, Region I (Massachusetts Section) in regard to the applicability of federal RCRA regulations under Massachusetts Rule 21(e) and license requirements for treating hazardous waste. Additional information may be necessary to evaluate the acceptability of the contaminated soil for disposal in Maine including:

- 1) a ruling from Massachusetts DEQE that treatment at the "Butter" property will be performed under Massachusetts Rule 21(e) and/or documentation of any permits or licenses required under state or federal regulations on hazardous waste;
- 2) documentation from Massachusetts DEQE that waste material from this site may be conditionally classified as a "special waste" and any conditions for such classification; and
- 3) approval from Massachusetts DEQE of a QA/QC sampling program used to classify any waste material treated under Rule 21(e).

Pending this information and the applicability of federal RCRA and Maine regulations, the material that you have submitted on site assessment, treatment process and sampling may also be helpful in evaluating the acceptability of treated hazardous waste for disposal in Maine.

If you have any questions, please contact me at 289-2651.

Sincerely,

MICHAEL S. HUDSON, ES III  
Division of Licensing & Enforcement  
Bureau of Oil & Hazardous Materials Control

MH/njs

Enclosure

REGIONAL OFFICES

• Bangor •

• Presque Isle •

KENNETH C. YOUNG, JR.

Two Central Plaza  
Augusta, Maine 04330  
207/622-4406

June 15, 1987

Steven Dressen  
Chief, Licensing and Engineering  
Division of Hazardous Waste  
Mass.DEQE  
1 Winter Street  
Boston, MA 02108

Dear Steve:

Thank you for speaking with me last Thursday. As I indicated I represent Chemfix Technologies, Inc. of Metairie, Louisiana. Chemfix is a sub contractor to Sverdrup, Inc. which has bid a contract with MBTA to rehabilitate the "Butter" site near the JFK/UMASS station on the Red Line.

A site assessment revealed the presence of lead contamination in soils at values exceeding E.P. toxicity levels for lead. Approximately 5000 cubic yards of soil are contaminated and considered hazardous.

Chemfix proposes to treat the contaminated soils on site to immobilize the lead using soluble silicates and calcium based setting agents thereby reducing E.P. toxicity levels to below hazardous levels. Tests conducted by Chemfix on representative samples of soils from the site demonstrate the efficacy of the Chemfix process. Chemfix proposes to remove the treated soil from the site and to dispose of it at a licensed, commercial facility at Norridgewock, Maine operated by Consolidated Waste Services.

Disposal at Norridgewock is contingent on approval by the Maine Department of Environmental Protection. Under the terms of its license, CWS may accept non-hazardous special waste on a case by case basis subject to information on physical characteristics and a QA/QC program focused on particular elements of concern. In my discussions with MDEP personnel they expressed concern over the RCRA regulation of the on-site treatment process in Massachusetts and the way in which the Rule 21E process was integrated with RCRA. In essence, if DEQE was able to license treatment and disposal under Rule 21E in a way that met RCRA requirements for treatment and disposal of hazardous materials using the Chemfix process, MDEP would then be able to determine whether disposal of the treated material in Maine as a special waste would be appropriate.

I understand from MDEP that they have been in contact with Iris Davis in the site assessment unit at the Woburn Regional

June 15, 1987

Page Two

Office regarding these concerns. Ms. Davis has been very helpful but is not able to discuss the concerns MDEP has regarding RCRA.

In order to get this moving, I would appreciate your reviewing the situation and providing me with your assessment of the way in which Chemfix can treat these materials on-site and dispose of them as a special waste in Maine. I believe that Ms. Davis has information concerning site assessments, sample test results pre and post application of the Chemfix process and Chemfix's QA/QC protocols. If you require any additional information, please contact me. Naturally, we want to resolve the concerns of the MDEP reasonable quickly and appreciate your willingness to assist. Thank you.

Sincerely,



Kenneth C. Young, Jr.

cc: Jim Coleman  
Director  
Office of Incident Response  
Division of Hazardous Waste  
Mass. DEQE  
1 Winter Street  
Boston, MA 02108

✓ Sonja B. Manuel  
Chemfix Technologies, Inc.  
Metairie Centre, Suite 620  
2424 Edenborn Avenue  
Metairie, LA 70001

Michael Hudson  
Oil and Hazardous Materials Control  
Maine DEP  
Station #17  
Augusta, Maine 04333

May 4, 1987

RECEIVED  
MAY 11 1987  
DEPARTMENT OF ENVIRONMENTAL  
PROTECTION

Mr. Richard J. Chalpin  
Deputy Regional Environmental Quality Engineering  
5 Commonwealth Avenue  
Woburn, Massachusetts 01801

Dear Mr. Chalpin:

SUBJECT: Demolition - JFK/UMASS Modernization Project  
Contract S3CN07 - Hazardous Waste Remediation  
Dorchester, Massachusetts

We are in receipt of your letter dated April 23, 1987 regarding the above-referenced project. There are a number of points I would like to clarify with regard to information required, and they are summarized as follows:

1. In a telephone conversation with Ms. Iris W. Davis of your office on February 18, 1987, Ms. Davis stated that no additional sampling and analysis of the north end sludge pile would be required, since this material was going to receive treatment by the chemical fixation process.
2. In our meeting of February 3, 1987, Ms. Davis questioned that the pH in the groundwater sample was 9.05 not the soil sample, and requested that the groundwater, not the soil, be tested again. The testing was completed and received by Sverdrup on March 4, 1987 and forwarded to DEQE. The results from this second testing also indicated an elevated pH of 9.17. This was discussed with Ms. Davis in a telephone conversation on March 30, 1987, at which time we agreed that the elevated pH was most likely due to the adjacent sludge piles and that no additional testing would be required.
3. During our meeting of February 3, 1987, and in the minutes of the meeting, we indicated that the Health and Safety plan included in the remediation plan was for Sverdrup employees. The general contractor will be required to develop his own health and safety plan, complying with state and federal requirements, and he will also be required to have an industrial hygienist on his staff throughout the construction period. At our meeting Ms. Davis requested that we add random monitoring of workers to the contractor's health and safety plan and that no additional submissions would be required.

Mr. Richard J. Chalpin  
Page 2  
May 4, 1987

Based on our review of your letter dated April 23, 1987 we assume that DEQE concurs with the recommendations presented in the Remediation Plan and that no additional work is required.

Very truly yours,

SVERDRUP CORPORATION



James A. Pappas  
Chief Environmental Engineer  
New England Division

JAP/pjc

cc: George H. Smith, Jr. - MBTA  
Iris W. Davis - DEQE Woburn



S. RUSSELL SYLVA  
Commissioner  
35-2160

*The Commonwealth of Massachusetts*  
*Department of Environmental Quality Engineering*  
*Metropolitan Boston - Northeast Region*  
*5 Commonwealth Avenue*  
*Woburn, Massachusetts 01801*

April 23, 1987

Mr. James Pappas  
Chief Environmental Engineer  
Sverdrup Corporation  
38 Chauncy Street  
Boston, MA 02111

RE: DORCHESTER - JFK/UMASS  
Modernization Project

Dear Mr. Pappas:

This letter is to confirm the discussion of additional work that was needed for the JFK/UMASS station modernization project, as agreed upon at the February 3, 1987 meeting held at the Department of Environmental Quality Engineering (the Department) Regional Office in Woburn. You and Mr. Arnold Shorrock of Sverdrup Corporation, Mr. George Smith, Jr. representing the MBTA, and Ms. Iris Davis from the Department were present at the meeting.

The following was determined to be necessary in evaluating environmental risks and impacts at the JFK/UMASS modernization site:

- (1) DEQE requested the sampling and analysis of the north end sludge pile by EPA Method 8240.
- (2) All wells must be surveyed and depth to groundwater measured to specifically determine groundwater flow direction. (This information has since been submitted to the Department).
- (3) Soil at GZ-6 had an elevated pH reading of 9.05. GZ-6 must be resampled and tested for pH.
- (4) The Health and Safety plan for the JFK/UMASS modernization project must be submitted to the Department.
- (5) Mr. Pappas inquired about permits that the Department might require for the modernization program. No permits will be required by the Department as long as all water used in the Chem Fix process is contained on site and disposed of properly, and no water is being discharged to the ground, surface water, storm drain, or sewers.

Mr. James Pappas  
Page 2

If you have any further questions please call Iris Davis at 935-2160 or at the letterhead address.

Very truly yours,

*for* *Varthas K. Karacis*  
Richard J. Chalpin  
Deputy Regional  
Environmental Engineer

RJC/ID/ae

cc: DEQE, DSHW  
Madeline Snow  
One Winter St  
Boston, MA 02108

Mr. George Smith, Jr.  
Project Manager, Construction  
South Station Project Office  
P.O. Box 1225 GMF  
Boston, MA 02205



S. RUSSELL SYLVA  
Commissioner  
35-2160

*The Commonwealth of Massachusetts*

*Department of Environmental Quality Engineering  
Metropolitan Boston - Northeast Region*

*5 Commonwealth Avenue  
Woburn, Massachusetts 01801*

April 23, 1987

Mr. James Pappas  
Chief Environmental Engineer  
Sverdrup Corporation  
38 Chauncy Street  
Boston, MA 02111

RE: DORCHESTER - JFK/UMASS  
Modernization Project

Dear Mr. Pappas:

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Mr. James Pappas  
Page 2

If you have any further questions please call Iris Davis at 935-2160 or at the letterhead address.

Very truly yours,

*Arthur K. Karan*

for

Richard J. Chalpin  
Deputy Regional  
Environmental Engineer

RJC/ID/ae

cc: DEQE, DSHW  
Madeline Snow  
One Winter St  
Boston, MA 02108

Mr. George Smith, Jr.  
Project Manager, Construction  
South Station Project Office  
P.O. Box 1225 GMF  
Boston, MA 02205

**MASSACHUSETTS  
BAY  
TRANSPORTATION  
AUTHORITY**

South Station Project Office  
P.O. Box 1225, GMF, Boston, MA 02205 April 6, 1987

Ms. Iris W. Davis  
Environmental Analyst  
Department of Environmental  
Quality Engineering  
5 Commonwealth Avenue  
Woburn, MA 01801

RECEIVED  
APR 9 1987  
Q.E.-Northeast Region

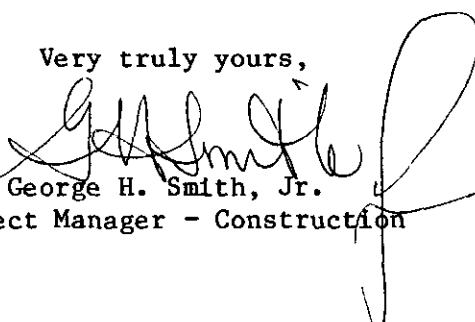
RE: DEMOLITION - JFK/U MASS  
PROJECT CONTRACT S3CN07  
HAZARDOUS WASTE REMEDIATION  
DORCHESTER, MASSACHUSETTS

Dear Ms. Davis:

In accordance with our meeting of February 3, 1987, we have proceeded in good faith with the preparation of the plans and specifications for the remediation of JFK/U Mass MBTA property, in anticipation of your letter of concurrence. To date, we have not received this letter and are anxiously awaiting it so that we can advertise the project for public bidding. At present, the project is scheduled to be advertised for bid on April 10, 1987.

We would appreciate your earliest attention to this matter so that we may eliminate this final loose end.

Very truly yours,

  
George H. Smith, Jr.

Project Manager - Construction

GHS/ajt

xc: A. Shorrock - S&P

ERCO

205 Alewife Brook Parkway, Cambridge, Massachusetts 02138 (617) 661-3111 Telex 650-256-7697 (MCI)

A DIVISION OF  
**ENSECO**  
INCORPORATED

GOLDBERG  
& ASSOCIATES

MAR 4 1987

March 3, 1987

Mr. E. W. Pickering  
Goldberg-Zoino & Associates  
320 Needham Street  
Newton Upper Falls, MA 02164

Dear Ted:

Re: Project # 6-3876.2  
P.O. # 12662

Enclosed are the results of analysis of a single water sample received on February 24, 1987. The sample was analyzed for volatile aromatics using EPA Protocols.

If you have any questions regarding the data, please call.

Sincerely,



T.R. Copeland, Ph.D.  
Director, Industrial Consulting

TRC:sbm  
Encl.

Regional and international offices:

- 2400 West Loop South, Suite 300, Houston, Texas 77027 (713) 960-9411
- 123 Grove Avenue, Suite 118, Cedarhurst, New York 11516 (516) 295-1162
- c/o Bectech Trading Co., Ltd., P.O. Box 101-41, Taipei, Taiwan (R.O.C.) Tel. 5013908

CLIENT: Goldberg-Zoino & Associates  
CLIENT ID: GZ-101  
ERCO ID: 87-002298  
SAMPLE RECEIVED: 02/24/87  
ANALYSIS COMPLETED: 02/25/87  
RESULTS IN: µg/l (ppb)

VOLATILE ORGANICS ANALYSIS  
BY EPA METHOD 602

- Data Report -

Compound	Result
----------	--------

Benzene	ND
Toluene	ND
Ethylbenzene	ND
p-Xylene	ND
Chlorobenzene	ND
m-Xylene	ND
o-Xylene	ND
Styrene	ND
n-Propylbenzene	ND
o-Chlorotoluene	ND
Trimethyl benzene	ND
p-Dichlorobenzene	ND
m-Dichlorobenzene	ND
o-Dichlorobenzene	ND
1,2,4-Trichlorobenzene	ND

ND = Not detected above the minimum reporting limit of 1 ppb.

Reported by: JR

Checked by: va

CLIENT: Goldberg-Zoino & Associates VOLATILE ORGANICS ANALYSIS  
CLIENT ID: Blank Spike BY EPA METHOD 602  
ERCO ID: AR 181  
SAMPLE RECEIVED: 02/24/87  
ANALYSIS COMPLETED: 02/25/87  
RESULTS IN: µg/l (ppb) - Data Report -

Compound	Result*
Benzene -----	22 (110)
Toluene -----	26 (130)
Ethylbenzene -----	25 (125)
p-Xylene	ND
Chlorobenzene	ND
m-Xylene	ND
o-Xylene	ND
Styrene	ND
n-Propylbenzene	ND
o-Chlorotoluene	ND
Trimethyl benzene	ND
p-Dichlorobenzene -----	21 (105)
m-Dichlorobenzene -----	25 (125)
o-Dichlorobenzene -----	23 (115)
1,2,4-Trichlorobenzene	ND

ND = Not detected above the minimum reporting limit of 1 ppb.

\*Percent recovery, in parentheses, is based on a spike concentration of 20 ppb.

Reported by: JLChecked by: [Signature]

February 25, 1987

Ms. Iris Davis  
Environmental Analyst  
Department of Environmental Quality Engineering  
5 Commonwealth Avenue  
Woburn, MA 01801

SUBJECT: Demolition - JFK/UMASS MBTA Modernization Project  
Contract S3CN07 - Hazardous Waste Remediation  
Dorchester, Massachusetts

Dear Ms. Davis:

In accordance with our telephone conversation of February 24, 1987, I am forwarding the following groundwater level data obtained during a site visit on February 19, 1987:

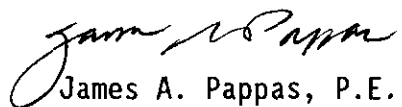
GZ - 100	EI. 109.5±
GZ - 101	EI. 109.5±
GZ - 102	EI. 107.0±
GZ - 6	EI. 114 ± (this was scheduled twice during the site visit)

We have also sent out barrel sample D-24 for an EPA 602 test. As soon as the results are available, they will be forwarded to your attention.

If you have any additional questions, do not hesitate to contact me. We look forward to the receipt of your letter of concurrence in the immediate future.

Very truly yours,

SVERDRUP CORPORATION



James A. Pappas, P.E.  
Chief Environmental Engineer  
New England Division

JAP:mam

cc: George H. Smith, Jr. - MBTA

SVERDRUP CORPORATION  
BOSTON, MASSACHUSETTS

RECEIVED  
FEB 9 - 1987

Northeast Region

MEMORANDUM FOR RECORD

FROM: James A. Pappas  
DATE: February 5, 1987  
SUBJECT: Meeting with DEQE

On Tuesday February 3, 1987 a meeting was held at the Department of Environmental Engineering Regional Office in Woburn, to review and discuss the Hazardous Waste Remediation Plan for the JFK/UMASS Station Modernization Project (Harry Butter Property). The following were in attendance:

James A. Pappas	Sverdrup
Arnold L. Shorrock	Sverdrup
George H. Smith, Jr.	MBTA
Iris W. Davis	DEQE

The purpose of the meeting was to formally discuss the comments generated by Ms. Davis in her review of the Remediation Plan. Over the past month I have had a number of telephone conversation with Ms. Davis, all of which were discussed at this meeting. The following is a summary of our discussions and any additional work required:

- o The conductivity in the north end of the sludge pile is very high. DEQE would like to see the results of an EPA 8024 test on a sample of the materials. ?
- o Barrel D-24 has a flashpoint less than 70. DEQE would like to see the results of an EPA 602 test on a sample of the drum liquid.
- o On page 1-10 of the report we refer to the levels of VOC's as "typical for urban/industrial areas." DEQE would like to know how this determination was made. I forwarded a copy of the VOC test results for the borings to Ms. Davis this afternoon (2/3/87).
- o DEQE is concerned with the possible soil and groundwater contamination of VOC's. They have requested that we do a ~~head~~ ~~base~~ level in the existing observation well to determine the flow of the groundwater. ?

MEMORANDUM FOR RECORD

Page Two

February 5, 1987

- o DEQE questioned why the pH in GZ-6 was so high. I stated it is most likely due to runoff from the sludge piles. Ms. Davis has requested that we obtain an additional pH reading from the observation well in GZ-6.
- o DEQE requested we submit a final copy of our health and safety plan. I indicated that the plan to be used would ultimately be developed by the contractor and that we would have an industrial hygienist on our staff to review the Contractor's plan and monitor his plan during construction. Given that, Ms. Davis requested that we add random monitoring of individual workers to the health and safety plan.
- o I asked Ms. Davis whether any permits were required or whether their approval/concurrence letter was all that was required. Ms. Davis indicated that as far as she knew, the DEQE letter of concurrence is all that was required. Ms. Davis will confirm this.
- o Finally, Ms. Davis indicated that DEQE would issue a letter of concurrence contingent upon performance of the above-referenced items.

  
James A. Pappas

JAP:mam

cc: George H. Smith, Jr. - MBTA  
Iris W. Davis - DEQE



JAN 09 1987

BY

*James A. Pappas*  
James A. Pappas

GOLDBERG-ZOINO & ASSOCIATES, INC.  
 GEOTECHNICAL/GEOHYDROLOGICAL  
 CONSULTANTS

PROJECT  
 JFK/U Mass Station  
 Dorchester, MA

REPORT BORING NUMBER GZ-100  
 SHEET 1 OF 1  
 DATE 4/30/86 FILE G-3876.1

BORING CO. GZA Drilling Inc.  
 FOREMAN F. Perry  
 GZA ENGINEER M. Stoughton/dkr

BORING LOCATION See Plan  
 GROUND ELEV. 116.11 (MBTA Datum)  
 DATE STARTED 4/30/86 DATE ENDED 4/30/86

CASING SAMPLER  
 SIZE: 3-3/4" Hollow Stem Auger TYPE: Split Spoon 24" OTHER:  
 HAMMER: 140 lb. FALL: 30"

GROUNDWATER READINGS  
 DATE DEPTH CASING AT STABILIZATION TIME  
 5/5 6.6' ON 6 DAYS

DEPTH	CAS. BL. /FT.	SAMPLE			SAMPLE DESCRIPTION	STRATA CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS.
		NO.	PEN./REV.	DEPTH					
		S-1	24/11	0.5-2.5	5-3 4-7	GRANULAR FILL	Bentonite Seal 2'-3'	0.3	1
5		S-2	24/9	5-7	7-5 3-3			0.6	
10		S-3	24/17	10-12	1-1 2-2			0	
15		S-4	24/18	15-17	5-7 8-10				
20					Bottom of boring at 17.0 feet.	SILT			

REMARKS: 1. Field testing results represent total organic vapor levels, referenced to a 1-3 butadiene standard, measured in the headspace of sealed soil sample jars using an HNU Model PI-101 photoionization analyzer. Sample injection size was 30 cc. Results in parts per million (ppm).

NOTES: 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORINGS LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO FACTORS NOT ACCOUNTED FOR AT THE TIME MEASUREMENTS WERE MADE.





GOLDBERG-ZOINO & ASSOCIATES, INC.  
320 NEEDHAM ST., NEWTON UPPER FALLS, MA.

GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT

JFK/U MASS STATION  
DORCHESTER, MA

REPORT OF BORING No. GZ-6

SHEET 1 OF 3

FILE No. G-3876

CHKD. BY

BORING Co. GZA Drilling Inc.

FOREMAN F. Perry

GZA ENGINEER M. Stoughton

BORING LOCATION See plan.

GROUND SURFACE ELEVATION 116.06 DATUM MBTA

DATE START 5/9/86 DATE END 5/6/86

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A  
140lb HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300lb. HAMMER FALLING 24 in.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
5/6	10:30	10.1	WELL	1/2 HOUR

CASING SIZE: 4" I.D.

OTHER:

DEPTH (ft)	CASING (in)	SAMPLE				SAMPLE DESCRIPTION Burmister CLASSIFICATION	STRATUM DESCRIPTION
		No.	PEN. (in) REC	DEPTH (ft)	BLOWS/6"		
5		S-1	24/5	0.5-2.5	12-15	Medium dense, dark grey, fine to coarse SAND, some Silt.	GRANULAR FILL
					10-19		
7		S-2	24/11	5-7	7-5	Medium dense, dark grey fine to medium SAND, some (-) Silt.	FIBROUS PEAT
					11-9		
11		S-3	24/18	10-12	1-1	Soft, brown fibrous PEAT, little Sand grading into Medium dense, brown fine to medium SAND, some (-) Silt, strong gasoline odor.	FINE SAND
					5-9		
16		S-4	24/10	15-17	9-14	Dense, light brown fine SAND, little Silt, grading into yellow SILTY CLAY.	STIFF TO MEDIUM STIFF SILTY CLAY
					16-11		
25		S-5	24/24	20-22	3-4	Stiff, grey SILTY CLAY.	
					5-6		
30		S-6	24/20	25-27	3-3	Medium stiff, grey SILTY CLAY.	
					4-4		
		S-7	24/24	30-32	2-2	Medium stiff, grey SILTY CLAY.	
					4-4		

GRANULAR SOILS		COHESIVE SOILS	
BLOWS/FT.	DENSITY	BLOWS/FT.	DENSITY
0-4	V. LOOSE	< 2	V. SOFT
4-10	LOOSE	2-4	SOFT
10-30	M. DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
> 50	V. DENSE	15-30	V. STIFF
		> 30	HARD

REMARKS: 1. Monitoring well installed using a 5' x 1 1/2" PVC screen from 10 to 15 feet and 1 1/2" PVC riser pipe from 10 feet to approximately 2' above the ground surface. A 1' bentonite seal was placed at 3' below the ground surface and a locking vented protective casing was installed. Stickup 24'.



NOTES: 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.  
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING No. GZ-6

GOLDBERG-ZOINO & ASSOCIATES, INC.  
320 NEEDHAM ST., NEWTON UPPER FALLS, MA.

GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT

JFK/U MASS STATION  
DORCHESTER, MA

REPORT OF BORING No. GZ-6

SHEET 2 OF 3

FILE No. G-3876

CHKD. BY

DEPTH (ft)	CASING (in)	SAMPLE				SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
		No.	PEN. (in)	REC	DEPTH (ft)	BLOWS/6"		
35		S-8	24/22		35-37	1-2 4-4		
40		S-9	24/24		40-42	1-2 3-5		MEDIUM STIFF SILTY CLAY
45		S-10	24/24		45-47	1-1 3-3		
50		S-11	24/20		50-52	1-3 3-4		
55		S-12	24/24		55-57	1-2 3-3		
60		S-13	24/20		60-62	1-1 3-4		
65		S-14	24/20		65-67	5-5 4-4		
70		S-15	24/18		70-72	WOR/3 4-5		

REMARKS:



BORING No. GZ-6

GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

JFK/U MASS STATION  
DORCHESTER, MA

CHKD. BY

REMARKS:

BORING No. GZ-6

APPENDIX C

CAMBRIDGE ANALYTICAL ASSOCIATES RESULTS



R E P O R T   T O

Goldberg-Zoino & Associates  
The GEO Building  
320 Needham Street  
Newton Upper Falls, MA 02164  
Attn: Ms. Kim Jaworski

Work ID: G3876.1  
P.O. No.: 13353  
Work Order: 86-05-118

Cambridge Analytical Associates  
Environmental Division  
1106 Commonwealth Avenue  
Boston MA      02215



Received: 05/21/86

## REPORT

Work Order # 86-05-118

06/23/86 13:51:37

REPORT Goldberg-Zoino &amp; Associates

TO The GEO Building

320 Needham Street

Newton Upper Falls, MA 02164

ATTEN Ms. Kim Jaworski

CLIENT GZA NEWTON

SAMPLES 15

COMPANY Goldberg-Zoino &amp; Associates

FACILITY 320 Needham Street

Newton Upper Falls, MA 02164

WORK ID G3876.1

TAKEN By Client

TRANS By Client

TYPE Soil and Water

P.O. # 13353

INVOICE under separate cover

PREPARED Cambridge Analytical Assoc.

BY Environmental Division

1106 Commonwealth Avenue

Boston, MA 02215

ATTEN

PHONE 617-232-2207

CONTACT COLE

This report is approved for release by the following staff:

Laboratory Director:

Inorganic Laboratory: *Barclay King & Leary*Organic Laboratory: *James D. Lutter*

## SAMPLE IDENTIFICATION

01	GZ-6
02	GZ-100
03	GZ-101
04	GZ-102
05	COMP. SAMPLE
06	INSIDE TANK
07	INSIDE TROUGH
08	OUTSIDE TROUGH
09	COMP GZ-6
10	COMP GZ-100
11	COMP GZ-101
12	COMP GZ-102
13	NORTH END OF PILE
14	SOUTH END OF PILE
15	SLUDGE DRUM

## TEST CODES and NAMES used

AG I A	Silver (Ag)-ICP
AG I S	Silver (Ag)-ICP
AS GFA	Arsenic (As)-furnace AAS
AS GFS	Arsenic (As)-furnace AAS
BA I A	Barium (Ba)-ICP
BA I S	Barium (Ba)-ICP
CD F A	Cadmium (Cd)-flame AAS
CD F S	Cadmium (Cd)-flame AAS
CD GFA	Cadmium (Cd)-furnace AAS
COND S	Conductivity-EPA 120.1
CR I A	Chromium (Cr)-ICP
CR I S	Chromium (Cr)-ICP
CU I A	Copper (Cu)-ICP
CU I S	Copper (Cu)-ICP
DIGSOL	Acid digestion-soil-SW846
DIG AQ	Acid digestion-liquid-SW846
EP EXT	EP tox extraction
FIL 45	Filtration-0.45 um filter
HG CVA	Mercury (Hg)-cold vapor
HG CVS	Mercury (Hg)-cold vapor

## on this report

OG A	Oil & grease-aq-EPA 413.1
OG S	Oil & grease-soil-EPA/COE
PB F A	Lead (Pb)-flame AAS
PB F S	Lead (Pb)-flame
PB GFA	Lead (Pb)-furnace AAS
PH S	pH-EPA 150.1
SE GFA	Selenium (Se)-furnace
SE GFS	Selenium (Se)-furnace
V624 A	VOC-aqueous-EPA 624
V624 S	VOC-solids-soil-SW846
ZN I A	Zinc (Zn)-ICP
ZN I S	Zinc (Zn)-ICP



Received: 05/21/86

## REPORT

Work Order # 86-05-118

## Results by Sample

SAMPLE ID GZ-6		SAMPLE # 01		FRACTIONS: A,B		Date & Time		Collected not specified		Category	
AG_I_A	0.16 mg/l	AS_GFA	0.010 mg/l	BA_I_A	<0.05 mg/l	CD_GFA	<0.001 mg/l	CR_I_A	<0.025 mg/l	CU_I_A	0.071 mg/l
FIL_45 date complete	05/21/86	HG_CVA	0.0002 mg/l	OG_A	3.2 mg/l	PB_GFA	<0.003 mg/l	SE_GFA	<0.003 mg/l	ZN_I_A	<0.02 mg/l
SAMPLE ID GZ-100		SAMPLE # 02		FRACTIONS: A,B		Date & Time		Collected not specified		Category	
AG_I_A	<0.01 mg/l	AS_GFA	<0.008 mg/l	BA_I_A	<0.05 mg/l	CD_GFA	<0.001 mg/l	CR_I_A	<0.025 mg/l	CU_I_A	0.015 mg/l
FIL_45 date complete	05/21/86	HG_CVA	<0.0002 mg/l	OG_A	<1.0 mg/l	PB_GFA	<0.003 mg/l	SE_GFA	<0.003 mg/l	ZN_I_A	0.03 mg/l
SAMPLE ID GZ-101		SAMPLE # 03		FRACTIONS: A,B,C		Date & Time		Collected not specified		Category	
AG_I_A	<0.01 mg/l	AS_GFA	<0.008 mg/l	BA_I_A	0.08 mg/l	CD_GFA	<0.001 mg/l	CR_I_A	<0.025 mg/l	CU_I_A	0.008 mg/l
FIL_45 date complete	05/21/86	HG_CVA	0.0009 mg/l	OG_A	<1.0 mg/l	PB_GFA	<0.003 mg/l	SE_GFA	<0.003 mg/l	ZN_I_A	0.19 mg/l



Received: 05/21/86

## REPORT

Work Order # 86-05-118

## Results by Sample

SAMPLE ID GZ-101

FRACTION 03C TEST CODE V624 A NAME VOC-aqueous-EPA 624

Date &amp; Time Collected not specified

Category

## Analysis

Completed: 6/3/86

COMPOUND	ug/L(ppb) (a)	COMPOUND	ug/L(ppb) (a)
Chloromethane.....		2-Chloroethylvinyl Ether.....	
Bromomethane.....		Bromoform.....	
Vinyl Chloride.....		1,1,2,2-Tetrachloroethane.....	
Chloroethane.....		Tetrachloroethylene.....	
Methylene Chloride.....		Toluene.....	
1,1-Dichloroethylene.....		Chlorobenzene.....	
1,1-Dichloroethane.....		Ethylbenzene.....	
trans-1,2-Dichloroethylene.....		total Xylenes.....	
Chloroform.....			
1,2-Dichloroethane.....		The following are non-priority pollutant	
1,1,1-Trichloroethane.....		Hazardous Substance List compounds.	
Carbon Tetrachloride.....			
Bromodichloromethane.....		Acetone.....	
1,2-Dichloropropane.....		Carbon Disulfide.....	
trans-1,3-Dichloropropene.....		2-Butanone (MEK).....	
Trichloroethylene.....		Vinyl Acetate.....	
Chlorodibromomethane.....		2-Hexanone (MPK).....	
1,1,2-Trichloroethane.....		4-Methyl-2-pentanone (MIBK).....	
Benzene.....		Styrene.....	
cis-1,3-Dichloropropene.....		DETECTION LIMIT.....	1

(a) - Concentrations less than the detection limit are left blank  
Concentrations between 1 and 10 times the detection limit  
are listed as trace levels 'TR'.



SAMPLE ID GZ-102

SAMPLE # 04 FRACTIONS: A, B

Date & Time Collected not specified

Category

AG_I_A	AS_GFA	BA_I_A	CD_GFA	CR_I_A	CU_I_A
<0.01 mg/l	<0.008 mg/l	0.07 mg/l	<0.001 mg/l	<0.025 mg/l	<0.007 mg/l

FIL 45 05/21/86  
date complete

HG_CVA	0.0003	mg/l
OG_A	<1.0	mg/l
PB_GFA	<0.003	mg/l
SE_GFA	<0.003	mg/l
ZN_I_A	<0.02	mg/l

SAMPLE ID	COMP.	SAMPLE
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23
24	24	24
25	25	25
26	26	26
27	27	27
28	28	28
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31	31	31
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42	42	42
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67	67	67
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69	69	69
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71	71	71
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73	73	73
74	74	74
75	75	75
76	76	76
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78	78	78
79	79	79
80	80	80
81	81	81
82	82	82
83	83	83
84	84	84
85	85	85
86	86	86
87	87	87
88	88	88
89	89	89
90	90	90
91	91	91
92	92	92
93	93	93
94	94	94
95	95	95
96	96	96
97	97	97
98	98	98
99	99	99
100	100	100

SAMPLE # 05 FRACTIONS: A

[illegible]

Category

AG_I_A	AS_GFA	BA_I_A	CD_GFA	CR_I_A	CU_I_A
mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
<0.01	<0.008	<0.05	0.032	<0.025	0.24

DIG\_AQ\_05/25/86  
date complete

HG_CVA	<0.0004	PB_GFA	0.25	SE_GFA	<0.005	ZN_I_A	4.2
	mg/l		mg/l		mg/l		mg/l

SAMPLE ID INSIDE TANK

SAMPLE # 06 FRACTIONS: A

<u>Date &amp; Time</u>	<u>Collected</u>	<u>not specified</u>

Category

OG A 1.7  
mg/l

SAMPLE ID INSIDE TROUGH

**SAMPLE # 07 FRACTIONS: A**

Date & Time Collected not specified

Category

OG\_A\_\_\_\_\_<1.0  
mg/l

SAMPLE ID OUTSIDE TROUGH

SAMPLE # 08 FRACTIONS: A, B

<u>Date &amp; Time</u>	<u>Collected</u>	<u>not specified</u>
10/10/78	10/10/78	10/10/78
10/11/78	10/11/78	10/11/78
10/12/78	10/12/78	10/12/78
10/13/78	10/13/78	10/13/78
10/14/78	10/14/78	10/14/78
10/15/78	10/15/78	10/15/78
10/16/78	10/16/78	10/16/78
10/17/78	10/17/78	10/17/78
10/18/78	10/18/78	10/18/78
10/19/78	10/19/78	10/19/78
10/20/78	10/20/78	10/20/78
10/21/78	10/21/78	10/21/78
10/22/78	10/22/78	10/22/78
10/23/78	10/23/78	10/23/78
10/24/78	10/24/78	10/24/78
10/25/78	10/25/78	10/25/78
10/26/78	10/26/78	10/26/78
10/27/78	10/27/78	10/27/78
10/28/78	10/28/78	10/28/78
10/29/78	10/29/78	10/29/78
10/30/78	10/30/78	10/30/78
10/31/78	10/31/78	10/31/78
11/1/78	11/1/78	11/1/78
11/2/78	11/2/78	11/2/78
11/3/78	11/3/78	11/3/78
11/4/78	11/4/78	11/4/78
11/5/78	11/5/78	11/5/78
11/6/78	11/6/78	11/6/78
11/7/78	11/7/78	11/7/78
11/8/78	11/8/78	11/8/78
11/9/78	11/9/78	11/9/78
11/10/78	11/10/78	11/10/78
11/11/78	11/11/78	11/11/78
11/12/78	11/12/78	11/12/78
11/13/78	11/13/78	11/13/78
11/14/78	11/14/78	11/14/78
11/15/78	11/15/78	11/15/78
11/16/78	11/16/78	11/16/78
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11/18/78	11/18/78	11/18/78
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11/20/78	11/20/78	11/20/78
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11/22/78	11/22/78	11/22/78
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11/24/78	11/24/78	11/24/78
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11/26/78	11/26/78	11/26/78
11/27/78	11/27/78	11/27/78
11/28/78	11/28/78	11/28/78
11/29/78	11/29/78	11/29/78
11/30/78	11/30/78	11/30/78
12/1/78	12/1/78	12/1/78
12/2/78	12/2/78	12/2/78
12/3/78	12/3/78	12/3/78
12/4/78	12/4/78	12/4/78
12/5/78	12/5/78	12/5/78
12/6/78	12/6/78	12/6/78
12/7/78	12/7/78	12/7/78
12/8/78	12/8/78	12/8/78
12/9/78	12/9/78	12/9/78
12/10/78	12/10/78	12/10/78
12/11/78	12/11/78	12/11/78
12/12/78	12/12/78	12/12/78
12/13/78	12/13/78	12/13/78
12/14/78	12/14/78	12/14/78
12/15/78	12/15/78	12/15/78
12/16/78	12/16/78	12/16/78
12/17/78	12/17/78	12/17/78
12/18/78	12/18/78	12/18/78
12/19/78	12/19/78	12/19/78
12/20/78	12/20/78	12/20/78
12/21/78	12/21/78	12/21/78
12/22/78	12/22/78	12/22/78
12/23/78	12/23/78	12/23/78
12/24/78	12/24/78	12/24/78
12/25/78	12/25/78	12/25/78
12/26/78	12/26/78	12/26/78
12/27/78	12/27/78	12/27/78
12/28/78	12/28/78	12/28/78
12/29/78	12/29/78	12/29/78
12/30/78	12/30/78	12/30/78
12/31/78	12/31/78	12/31/78

Category

OG A 2.1  
mg/l



Received: 05/21/86

## REPORT

### Results by Sample

Work Order # 86-05-118

**SAMPLE ID OUTSIDE TROUGH**

<u>FRACTION</u>	<u>08B</u>	<u>TEST CODE</u>	<u>V624 A</u>	<u>NAME</u>	<u>VOC-aqueous-EPA 624</u>	<u>Category</u>
Date & Time Collected	not specified					

## Analysis

Completed: 6/4/86

COMPOUND	ug/L(ppb) (a)	COMPOUND	ug/L(ppb) (a)
Chloromethane.....	_____	2-Chloroethylvinyl Ether.....	_____
Bromomethane.....	_____	Bromoform.....	_____
Vinyl Chloride.....	_____	1,1,2,2-Tetrachloroethane.....	_____
Chloroethane.....	_____	Tetrachloroethylene.....	_____
Methylene Chloride.....	_____	Toluene.....	_____
1,1-Dichloroethylene.....	_____	Chlorobenzene.....	_____
1,1-Dichloroethane.....	_____	Ethylbenzene.....	_____
trans-1,2-Dichloroethylene.....	_____	total Xylenes.....	_____
Chloroform.....	_____		
1,2-Dichloroethane.....	_____	The following are non-priority pollutant	
1,1,1-Trichloroethane.....	_____	Hazardous Substance List compounds.	
Carbon Tetrachloride.....	_____		
Bromodichloromethane.....	_____	Acetone.....	_____
1,2-Dichloropropane.....	_____	Carbon Disulfide.....	_____
trans-1,3-Dichloropropene.....	_____	2-Butanone (MEK).....	_____
Trichloroethylene.....	_____	Vinyl Acetate.....	_____
Chlorodibromomethane.....	_____	2-Hexanone (MPK).....	_____
1,1,2-Trichloroethane.....	_____	4-Methyl-2-pentanone (MIBK).....	_____
Benzene.....	_____	Styrene.....	_____
cis-1,3-Dichloropropene.....	_____		
		DETECTION LIMIT.....	10

(a) - Concentrations less than the detection limit are left blank  
Concentrations between 1 and 10 times the detection limit  
are listed as trace levels 'TR'.

Received: 05/21/86

## REPORT

Work order # 86-05-118

## Results by Sample

SAMPLE ID COMP GZ-6		SAMPLE # 09 FRACTIONS: A		Date & Time Collected not specified		Category					
AG I S	<2	AS GFS	10	BA I S	325	CD F S	13	CR I S	24	CU I S	82,000
ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)	
DIGSOL 05/23/86	date complete	HG CVS	0.29	PB F S	8,800	SE GFS	1.7	ZN I S	63,000		
		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)			

ppm

SAMPLE ID COMP GZ-100		SAMPLE # 10 FRACTIONS: A		Date & Time collected not specified		Category					
AG I S	<2.5	AS GFS	3.7	BA I S	93	CD F S	1.3	CR I S	32	CU I S	380
ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)	
DIGSOL 05/23/86	date complete	HG CVS	0.47	PB F S	200	SE GFS	0.71	ZN I S	630		
		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)			

SAMPLE ID COMP GZ-101		SAMPLE # 11 FRACTIONS: A		Date & Time collected not specified		Category					
AG I S	<2.0	AS GFS	6.1	BA I S	26	CD F S	8.9	CR I S	39	CU I S	8,400
ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)	
DIGSOL 05/23/86	date complete	HG CVS	0.60	PB F S	250	SE GFS	0.56	ZN I S	3,600		
		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)			

SAMPLE ID COMP GZ-102		SAMPLE # 12 FRACTIONS: A		Date & Time Collected not specified		Category					
AG I S	<3.5	AS GFS	5.0	BA I S	90	CD F S	1.9	CR I S	8.5	CU I S	180
ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)	
DIGSOL 05/23/86	date complete	HG CVS	0.25	PB F S	1,400	SE GFS	0.51	ZN I S	280		
		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)		ug/g (dry wt)			



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REPORT  
Results by Sample

Work Order # 86-05-118

SAMPLE ID NORTH END OF PILE		SAMPLE # 13		FRACTIONS: A,B,C,D	
		Date & Time Collected		not specified	
				Category	
AG_I_A	0.18 mg/l	AS_GFA	<0.008 mg/l	BA_I_A	1.4 mg/l
CU_I_A	540 mg/l	EP_EXT	06/05/86 date complete	HG_CVA	<0.0007 mg/l
SE_GFA	<0.015 mg/l	ZN_I_A	1,600 mg/l	CD_F_A	0.81 mg/l
				COND_S	4,900 umhos/cm @ 25 C
				QG_S	1,300 ug/g (dry wt)
				PB_F_A	240 mg/l
				CR_I_A	<0.025 mg/l
				PH_S	9.99 pH units



Received: 05/21/86

REPORT  
Results by Sample

Work Order # 86-05-118

SAMPLE ID NORTH END OF PILE

FRACTION 13D TEST CODE V624 S NAME VOC-solids-soil-SW846  
Date & Time Collected not specified Category

Analysis

Completed: 6/4/86

COMPOUND	ug/kg (ppb) -wet (a)	COMPOUND	ug/kg (ppb) -wet (a)
Chloromethane.....	_____	2-Chloroethylvinyl Ether.....	_____
Bromomethane.....	_____	Bromoform.....	_____
Vinyl Chloride.....	_____	1,1,2,2-Tetrachloroethane.....	_____
Chloroethane.....	_____	Tetrachloroethylene.....	_____
Methylene Chloride.....	_____	Toluene.....	_____
1,1-Dichloroethylene.....	_____	Chlorobenzene.....	_____
1,1-Dichloroethane.....	_____	Ethylbenzene.....	_____
trans-1,2-Dichloroethylene.....	_____	total Xylenes.....	_____
Chloroform.....	_____		
1,2-Dichloroethane.....	_____	The following are non-priority pollutant	
1,1,1-Trichloroethane.....	_____	Hazardous Substance List compounds.	
Carbon Tetrachloride.....	_____		
Bromodichloromethane.....	_____	Acetone.....	_____
1,2-Dichloropropane.....	_____	Carbon Disulfide.....	_____
trans-1,3-Dichloropropene.....	_____	2-Butanone (MEK).....	_____
Trichloroethylene.....	_____	Vinyl Acetate.....	_____
Chlorodibromomethane.....	_____	2-Hexanone (MPK).....	_____
1,1,2-Trichloroethane.....	_____	4-Methyl-2-pentanone (MIBK).....	_____
Benzene.....	_____	Styrene.....	_____
cis-1,3-Dichloropropene.....	_____	DETECTION LIMIT.....	10

(a) - Concentrations less than the detection limit are left blank  
Concentrations between 1 and 10 times the detection limit  
are listed as trace levels 'TR'.



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## REPORT

Work Order # 86-05-118

## Results by Sample

SAMPLE ID SOUTH END OF PILE		SAMPLE # 14 FRACTIONS: A,B,C,D		Date & Time Collected not specified		Category					
AG I A	0.07 mg/l	AS GFA	<0.008 mg/l	BA I A	2.2 mg/l	CD F A	0.14 mg/l	COND S	47	CR I A	<0.025 mg/l
CU I A	150 mg/l	EP EXT	06/05/86 date complete	HG CVA	<0.0007 mg/l	OG S	400 ug/g (dry wt)	PB F A	32	PH S	7.38 pH units
SE GFA	<0.015 mg/l	ZN I A	1.600 mg/l								

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REPORT  
Results by Sample

Work Order # 86-05-118

SAMPLE ID SOUTH END OF PILE

FRACTION 14D TEST CODE V624 S NAME VOC-solids-soil-SW846  
Date & Time Collected not specified Category

Analysis  
Completed: 6/4/86

COMPOUND	ug/kg (ppb) -wet(a)	COMPOUND	ug/kg (ppb) -wet(a)
Chloromethane.....		2-Chloroethylvinyl Ether.....	
Bromomethane.....		Bromoform.....	
Vinyl Chloride.....		1,1,2,2-Tetrachloroethane.....	
Chloroethane.....		Tetrachloroethylene.....	
Methylene Chloride.....		Toluene.....	
1,1-Dichloroethylene.....		Chlorobenzene.....	
1,1-Dichloroethane.....		Ethylbenzene.....	
trans-1,2-Dichloroethylene.....		total Xylenes.....	
Chloroform.....			
1,2-Dichloroethane.....		The following are non-priority pollutant	
1,1,1-Trichloroethane.....		Hazardous Substance List compounds.	
Carbon Tetrachloride.....			
Bromodichloromethane.....		Acetone.....	
1,2-Dichloropropane.....		Carbon Disulfide.....	
trans-1,3-Dichloropropene.....		2-Butanone (MEK).....	
Trichloroethylene.....		Vinyl Acetate.....	
Chlorodibromomethane.....		2-Hexanone (MPK).....	
1,1,2-Trichloroethane.....		4-Methyl-2-pentanone (MIBK).....	
Benzene.....		Styrene.....	
cis-1,3-Dichloropropene.....			
		DETECTION LIMIT.....	10

(a) - Concentrations less than the detection limit are left blank  
Concentrations between 1 and 10 times the detection limit  
are listed as trace levels 'TR'.



SAMPLE ID SLUDGE DRUM		SAMPLE # 15 FRACTIONS: A, B, C, D		Date & Time Collected not specified		Category					
AG_I_A	0.02 mg/l	AS_GFA	<0.008 mg/l	BA_I_A	0.15 mg/l	CD_F_A	<0.04 mg/l	COND_S	120 umhos/cm @ 25 C	CR_I_A	<0.025 mg/l
CU_I_A	19 mg/l	EP_EXT	06/05/86 date complete	HG_CVA	<0.0007 mg/l	OG_S	120,000 ug/g (dry wt)	PB_F_A	3.0 mg/l	PH_S	7.83 pH units
SE_GFA	<0.015 mg/l	ZN_I_A	32 mg/l								

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REPORT  
Results by Sample

Work Order # 86-05-118

SAMPLE ID SLUDGE DRUM

FRACTION 15D  
Date & Time Collected not specified

TEST CODE V624 S NAME VOC-solids-soil-SW846  
Category \_\_\_\_\_

Analysis  
Completed: 6/4/86

COMPOUND	ug/kg (ppb) -wet (a)	COMPOUND	ug/kg (ppb) -wet (a)
Chloromethane.....	_____	2-Chloroethylvinyl Ether.....	_____
Bromomethane.....	_____	Bromoform.....	_____
Vinyl Chloride.....	_____	1,1,2,2-Tetrachloroethane.....	_____
Chloroethane.....	_____	Tetrachloroethylene.....	_____
Methylene Chloride.....	_____	Toluene.....	tr(10)
1,1-Dichloroethylene.....	_____	Chlorobenzene.....	_____
1,1-Dichloroethane.....	_____	Ethylbenzene.....	_____
trans-1,2-Dichloroethylene.....	_____	total Xylenes.....	tr(50)
Chloroform.....	_____		
1,2-Dichloroethane.....	_____	The following are non-priority pollutant	
1,1,1-Trichloroethane.....	_____	Hazardous Substance List compounds.	
Carbon Tetrachloride.....	_____		
Bromodichloromethane.....	_____	Acetone.....	_____
1,2-Dichloropropane.....	_____	Carbon Disulfide.....	_____
trans-1,3-Dichloropropene.....	_____	2-Butanone (MEK).....	_____
Trichloroethylene.....	_____	Vinyl Acetate.....	_____
Chlorodibromomethane.....	_____	2-Hexanone (MPK).....	_____
1,1,2-Trichloroethane.....	_____	4-Methyl-2-pentanone (MIBK).....	_____
Benzene.....	_____	Styrene.....	_____
cis-1,3-Dichloropropene.....	_____	DETECTION LIMIT.....	10*

(a) - Concentrations less than the detection limit are left blank  
Concentrations between 1 and 10 times the detection limit  
are listed as trace levels 'TR'.



06/23/86 13:51:37 REPORT

Work Order # 86-05-118

Sample "sludge drum" (CAA ID 8605118-15) contains two compounds tentatively identified by the GC/MS library search procedure. These compounds are listed below.

Tentatively Identified Volatile Compounds  
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Compound	Approximate Concentrations (ug/l)*
----------	------------------------------------

Client ID: Sludge Drum

1,1,3-trimethyl-cyclohexane

280

trans-1,4-dimethyl cyclooctane

460

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\* Approximate concentration based on average response factor

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Goldberg-Zoino & Associates06/23/86 13:51:37  
REPORTWork Order # 86-05-118  
Continued From AboveResults of EP Toxicity Analyses  
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Constituent (mg/l)	Maximum Contaminant Level	Client ID: North End CAA ID: 8605118-13	South End 8605118-14	Sludge Drum 8605118-15
Arsenic	5.0	<0.008	<0.008	<0.008
Barium	100.	1.4	2.2	0.15
Cadmium	1.0	0.81	0.14	<0.04
Chromium	5.0	<0.025	<0.025	<0.025
Lead	5.0	240	32	3.0
Mercury	0.2	<0.0007	<0.0007	<0.0007
Selenium	1.0	<0.015	<0.015	<0.015
Silver	5.0	0.18	0.07	0.02
Copper	---	540	150	19
Zinc	---	1,500	1,600	32

  
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Received: 05/21/86

REPORT  
Test Methodology

Work Order # 86-05-118

TEST CODE AG\_I\_A NAME Silver (Ag)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Silver is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibrator is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.

TEST CODE AG\_I\_S NAME Silver (Ag)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Silver is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibrator is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.

TEST CODE AS\_GFA NAME Arsenic (As)-furnace AAS

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 206.2-arsenic (atomic absorption, graphite furnace).

Additional References: EPA. 1982. Test Methods for Evaluating Solid





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REPORT  
Test MethodologyWork Order # 86-05-118  
Continued From AboveTEST CODE AS\_GFA NAME Arsenic (As)-furnace AAS

Waste-Physical/Chemical Methods. SW-846 (Second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. Method 7060.

Method Description: Arsenic is determined by graphite furnace atomic absorption spectrophotometry on a Perkin-Elmer Model 5000 atomic absorption spectrophotometer using stabilized-temperature platforms, matrix modification, and Zeeman-effect background correction.

Quality Control Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.

TEST CODE AS\_GFS NAME Arsenic (As)-furnace AAS

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 206.2-arsenic (atomic absorption, graphite furnace).

Additional References: EPA. 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846 (Second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. Method 7060.

Method Description: Arsenic is determined by graphite furnace atomic absorption spectrophotometry on a Perkin-Elmer Model 5000 atomic absorption spectrophotometer using stabilized-temperature platforms, matrix modification, and Zeeman-effect background correction.

Quality Control Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.



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REPORT  
Test Methodology

Work Order # 86-05-118

TEST CODE BA I A NAME Barium (Ba)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Barium is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.

TEST CODE BA I S NAME Barium (Ba)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Barium is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.

TEST CODE CD F A NAME Cadmium (Cd)-flame AAS

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 213.1-cadmium (atomic absorption, direct aspiration).

Method Description: Cadmium is determined by flame atomic absorption



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REPORT  
Test MethodologyWork Order # 86-05-118  
Continued From AboveTEST CODE CD\_F\_A NAME Cadmium (Cd)-flame AAS

spectrophotometry on a Perkin Elmer Model 5000 atomic absorption spectrophotometer using an air-acetylene flame with deuterium arc background correction.

QC Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.

TEST CODE CD\_F\_S NAME Cadmium (Cd)-flame AAS

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 213.1-cadmium (atomic absorption, direct aspiration).

Method Description: Cadmium is determined by flame atomic absorption spectrophotometry on a Perkin Elmer Model 5000 atomic absorption spectrophotometer using an air-acetylene flame with deuterium arc background correction.

QC Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.

TEST CODE CD\_GFA NAME Cadmium (Cd)-furnace AAS

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 213.2-cadmium (atomic absorption, graphite furnace).

Additional References: EPA. 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846 (Second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. Method 7131.

Method Description: Cadmium is determined by graphite furnace atomic absorption spectrophotometry on a Perkin-Elmer Model 5000 atomic absorption



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REPORT  
Test MethodologyWork Order # 86-05-118  
Continued From AboveTEST CODE CD\_GFA NAME Cadmium (Cd)-furnace AAS

spectrophotometer using stabilized-temperature platforms, matrix modification, and Zeeman-effect background correction, or a Perkin-Elmer Model 2380 atomic absorption spectrophotometer using stabilized temperature platforms, matrix modification, and deuterium arc background correction.

Quality Control Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.

TEST CODE COND\_S NAME Conductivity-EPA 120.1

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Waste. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 120.1-Specific conductance.

Method Description: Specific conductance is determined using a Beckman Instruments Model RC-16C Conductivity Bridge.

Quality Control Procedures: Before each run, instrument calibration is checked using a solution of 0.01 N KCl.

TEST CODE CR\_I\_A NAME Chromium (Cr)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Chromium is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are prepared with each batch of



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REPORT  
Test MethodologyWork Order # 86-05-118  
Continued From AboveTEST CODE CR\_I\_A NAME Chromium (Cr)-ICP

samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.

TEST CODE CR\_I\_S NAME Chromium (Cr)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Chromium is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibrator is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.

TEST CODE CU\_I\_A NAME Copper (Cu)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Copper is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibrator is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.



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REPORT  
Test Methodology

Work Order # 86-05-118

TEST CODE CU I S NAME Copper (Cu)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Copper is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.

TEST CODE DIGSOL NAME Acid digestion-soil-SW846

Method Description: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Section 4.1.3.

Additional references: EPA. 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846. EPA/Office of Solid Waste, Washington, DC.

Method Description: A 1.0-g aliquot of dried and ground sample is transferred to an acid-washed beaker. Following addition of 10 ml of 1:1 Instra-analyzed nitric acid, the sample is placed on a hot plate and refluxed for 10 min. without boiling. After cooling, a 5-ml portion of concentrated acid is added and the sample is refluxed for 30 min. After sample has cooled a second time 2-ml of deionized water is added, followed by 3 ml of 30 % hydrogen peroxide, and the sample is relaxed until digestion is complete (generally indicated by a yellow color). Additional hydrogen peroxide is added until no change in sample composition is observed (not more than 10-ml hydrogen peroxide). For furnace AAS determinations, the sample is diluted to 100 ml with distilled, deionized water so that the final acid concentration is 0.5 %. For flame AAS and ICP determinations, and for furnace determinations of Sb and Sn, the final dilution is performed with 1:1 HCl (5 ml/100 ml of solution). Insoluble material is removed by filtering or settling.



TEST CODE DIG\_AQ NAME Acid digestion-aqueous-EPA

Method Description: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Section 4.1.3.

Additional references: EPA. 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846. EPA/Office of Solid Waste, Washington, DC.

Method Description: A 100-ml aliquot of sample is transferred to an acid-washed beaker. Following addition of 3 ml of concentrated Instra-analyzed nitric acid, the sample is placed on a hot plate and evaporated to near-dryness without boiling. After cooling, another 3-ml portion of acid is added, followed by 2 ml of 30 % hydrogen peroxide, and the sample is relaxed until digestion is complete (generally indicated by a yellow color). Additional acid is added until no change in sample composition is observed. The sample is again taken to near-dryness. For furnace AAS determinations, the sample is diluted to 100 ml with distilled, deionized water so that the final acid concentration is 0.5 %. For flame AAS and ICP determinations, and for furnace determinations of Sb and Sn, the final dilution is performed with 1:1 HCl (5 ml/100 ml of solution). Insoluble material is removed by filtering or settling.

TEST CODE EP\_EXT NAME EP tox extraction

Method Reference: EPA. 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846 (second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. Method 1310.

Method Description: This method simulates leaching of material if disposed in an improperly designed landfill. If a representative sample of the material contains more than 0.5 % solids, the solid phase is extracted with deionized water which is maintained at pH 5 +/- 0.2 with acetic acid. The extract is filtered and analyzed for metals, pesticides, and herbicides to determine if concentrations exceed regulated thresholds.

Quality Control Procedures: A procedural blank is analyzed with each batch of samples. Duplicate analyses are performed at a frequency of 10 % or one with each batch of samples. For metals analysis of the EP leachates, all analyses employ the method of additions.

Received: 05/21/86

REPORT  
Test Methodology

Work Order # 86-05-118

TEST CODE FIL 45 NAME Filtration-0.45 um filter

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Waste. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Section 4.4.1-metals (sample handling and preservation).

Method Description: The sample is filtered through an acid-rinsed 0.45 um filter. The filtrate is collected in an acid-cleaned polyethylene bottle and preserved with nitric acid to pH <2.

Quality Control Procedures: A procedural blank is run with each batch of samples. Distilled, deionized water is passed through a membrane filter treated in the same manner as those used for samples. The filtrate is analyzed with the samples.





TEST CODE HG\_CVA NAME Mercury (Hg)-cold vapor

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 245.1-Mercury (Manual Cold Vapor Technique).  
Additional References: EPA. 1982. Test Methods for Evaluating Solid Waste. SW-846-Second edition. (Update No. 1-April 1984). EPA/Office of Solid Waste, Washington, DC. Method 7470-Mercury (Manual Cold-Vapor Technique).

Method Description: Mercury is determined in drinking, surface and saline waters, as well as domestic and industrial wastes by digestion of sample in sulfuric and nitric acids, followed by oxidation with potassium permanganate and potassium persulfate. Mercury in the digested sample is then measured by cold vapor atomic absorption spectrophotometry on a SpectroProducts Hg-3 analyzer.

Quality Control Procedures: Instrumental calibration is performed by analyzing a blank and four or more working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Matrix spikes and duplicates are analyzed at a frequency of 10 %.

TEST CODE HG\_CVS NAME Mercury (Hg)-cold vapor

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 245.5-Mercury in Sediment (manual cold vapor technique).  
Additional References: EPA. 1982. Test Methods for Evaluating Solid Waste. SW-846-Second edition. (Update No. 1-April 1984). EPA/Office of Solid Waste, Washington, DC. Method 7471-Mercury in Solid or Semi-solid Waste (manual cold-vapor technique).

Method Description: Mercury is determined in soils, sediments, bottom deposits, and sludges by digestion of sample in aqua regia for 2 min at 95 C, followed by oxidation with potassium permanganate and potassium persulfate. Mercury in the digested sample is then measured by cold vapor atomic absorption spectrophotometry on a SpectroProducts Hg-3 analyzer.

Quality Control Procedures: Instrumental calibration is performed by analyzing a blank and four or more working standards. Accuracy of working standards is verified by analysis of an independent check standard. With each batch of 10 samples and for each different matrix, one matrix spike and one duplicate analysis are performed.

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Received: 05/21/86

REPORT  
Test Methodology

Work Order # 86-05-118

TEST CODE OG\_S NAME Oil & grease-soil-EPA/COE

Method Reference: Plumb, R.H., Procedure for Handling and Chemical Analysis of Sediment and Waste Samples. Technical Report EPA/CE-81-1. US Army Engineer Waterways Experiment Station, CE, Vicksburg, Mississippi.

Method Description: The analytes in a solid sample are isolated by solvent extraction. The extract is then concentrated and weighed on an analytical balance.

Quality Control Procedures: The analytical balance is calibrated every twelve hours and certified every six months by the manufacturer. Additional quality control includes the analysis of replicates, reference spikes, and blanks.



Received: 05/21/86

REPORT  
Test Methodology

Work Order # 86-05-118

TEST CODE PB F A NAME Lead (Pb)-flame AAS

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 239.1-lead (atomic absorption, direct aspiration).

Method Description: Lead is determined by flame atomic absorption spectrophotometry on a Perkin Elmer Model 5000 atomic absorption spectrophotometer using an air-acetylene flame with deuterium arc background correction.

QC Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.

TEST CODE PB F S NAME Lead (Pb)-flame

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 239.1-lead (atomic absorption, direct aspiration).

Method Description: Lead is determined by flame atomic absorption spectrophotometry on a Perkin Elmer Model 5000 atomic absorption spectrophotometer using an air-acetylene flame with deuterium arc background correction.

QC Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.

TEST CODE PB GFA NAME Lead (Pb)-furnace AAS

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 239.2-lead (atomic absorption, graphite furnace).

Additional References: EPA. 1982. Test Methods for Evaluating Solid



Received: 05/21/86

REPORT  
Test MethodologyWork Order # 86-05-118  
Continued From AboveTEST CODE PB\_GFA NAME Lead (Pb)-furnace AAS

Waste-Physical/Chemical Methods. SW-846 (Second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. Method 7421.

Method Description: Lead is determined by graphite furnace atomic absorption spectrophotometry on a Perkin-Elmer Model 5000 atomic absorption spectrophotometer using stabilized-temperature platforms, matrix modification, and Zeeman-effect background correction, or a Perkin-Elmer Model 2380 atomic absorption spectrophotometer using stabilized temperature platforms, matrix modification, and deuterium arc background correction.

Quality Control Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.

TEST CODE PH\_S NAME pH-EPA 150.1

Method Reference: EPA/COE. 1981. Procedures for Handling and Chemical Analyses of Sediment and Water Samples. EPA/COE Technical Committee on Criteria for Dredged and Fill Material, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MI.

Method Description: A slurry of soil or sediment and distilled water (1:1) by weight is transferred to a beaker and pH is determined using an Orion pH meter equipped with a glass combination electrode.

Quality Control Procedures: Prior to use, the pH meter is calibrated using pH 4,7, and 10 buffers. Accuracy of the calibration is verified by analysis of an EPA reference solution.

TEST CODE SE\_GFA NAME Selenium (Se)-furnace

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 270.2-selenium (atomic absorption, graphite furnace).

Additional References: EPA. 1982. Test Methods for Evaluating Solid



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REPORT  
Test Methodology

Work Order # 86-05-118  
Continued From Above

TEST CODE SE\_GFA NAME Selenium (Se)-furnace

Waste-Physical/Chemical Methods. SW-846 (Second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. Method 7740.

Method Description: Selenium is determined by graphite furnace atomic absorption spectrophotometry on a Perkin-Elmer Model 5000 atomic absorption spectrophotometer using stabilized-temperature platforms, matrix modification, and Zeeman-effect background correction.

QC Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.

TEST CODE SE\_GFS NAME Selenium (Se)-furnace

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 270.2-selenium (atomic absorption, graphite furnace).

Additional References: EPA. 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846 (Second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. Method 7740.

Method Description: Selenium is determined by graphite furnace atomic absorption spectrophotometry on a Perkin-Elmer Model 5000 atomic absorption spectrophotometer using stabilized-temperature platforms, matrix modification, and Zeeman-effect background correction.

QC Procedures: The instrument is calibrated using a blank and at least three working standards. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are performed with each batch of samples. Duplicates and matrix spikes are performed at a frequency of 10 %.



Received: 05/21/86

REPORT  
Test Methodology

Work Order # 86-05-118

TEST CODE V624\_A NAME VOC-aqueous-EPA 624

Method Reference: U.S. EPA, 1984. Methods for Organic Analysis of Municipal and Industrial Wastewater. Appendix A. 40CFR Part 136. Federal Register, Vol. 49, No. 209. Method 624, test method for volatile organic compounds.

Method Description: The analytes in an aqueous sample are isolated and concentrated by purging the sample with inert gas and trapping them on an absorbant. The absorbant is thermally desorbed into a gas chromatograph (GC) where the analytes are separated and detected with a mass spectrometric (MS) detector.

Quality Control Procedures: The GC/MS is tuned daily with bromofluorobenzene (BFB). Instrument response is calibrated daily using EPA traceable standard reference solutions. Analytes are quantified using the internal standard method. Surrogate standard compounds are added to every sample to monitor method performance. Additional quality control includes the analysis of matrix spikes, duplicate matrix spikes, and blanks.

TEST CODE V624\_S NAME VOC-solids-soil-SW846

Method Reference: U.S. EPA, 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. Second Edition. SW-846. EPA/Office of Solid Waste, Washington, D.C. Method 5030/8240, test method for volatile organic compounds.

Method Description: The analytes in a solid sample are isolated and concentrated by purging the sample with inert gas and trapping them on an absorbant. The absorbant is thermally desorbed into a gas chromatograph (GC) where the analytes are separated and detected with a mass spectrometric (MS) detector.

Quality Control Procedures: The GC/MS is tuned daily with bromofluorobenzene (BFB). Instrument response is calibrated daily using EPA traceable standard reference solutions. Analytes are quantified using the internal standard method. Surrogate standard compounds are added to every sample to monitor method performance. Additional quality control includes the analysis of matrix spikes, duplicate matrix spikes and blanks.



Received: 05/21/86

REPORT  
Test Methodology

Work Order # 86-05-118

TEST CODE ZN\_I\_A NAME Zinc (Zn)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Zinc is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.

TEST CODE ZN\_I\_S NAME Zinc (Zn)-ICP

Method Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600-4/79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. Method 200.7-Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes.

Method Description: Zinc is determined by inductively coupled argon plasma emission spectroscopy on a Jarrell-Ash Model 2000 sequential plasma spectrometer.

Quality Control Procedures: The instrument is calibrated using a blank and a 10 ppm standard. Accuracy of the working standards is verified by analysis of an independent EPA or NBS reference standard, and calibration is checked every 10 samples during the run. Procedural blanks are prepared with each batch of samples. Duplicates and matrix spikes are analyzed at a frequency of 10 %.



December 22, 1986

Department of Environmental Quality Engineering  
5 Commonwealth Avenue  
Woburn, MA 01801

Attention: Ms. Iris Davis  
Environmental Analyst

Gentlemen:

Subject: Demolition - JFK/UMass MBTA Modernization Project  
Contract S3CN07 - Hazardous Waste Remediation  
Dorchester, Massachusetts

On behalf of the Massachusetts Bay Transportation Authority (MBTA), we are forwarding herewith two (2) copies of the Final Hazardous Waste Remediation Plan for the above-mentioned project, for your concurrence. We understand that a meeting has been tentatively scheduled for the week of December 29, 1986 to review the plan with James A. Pappas of our office.

This immediate attention given to our project is very much appreciated due to the project schedule; requiring a completed clean-up by October 31, 1987.

If you have any questions, do not hesitate to contact James A. Pappas or myself.

Very truly yours,

SVERDRUP CORPORATION



Arnold L. Shorrock

ALS:lr  
Encl.

cc: George H. Smith, Jr. - MBTA (3 copies)  
James D. Pappas - Sverdrup

November 14, 1986

Department of Environmental Quality Engineering  
5 Commonwealth Avenue  
Woburn, Massachusetts 01801

ATTENTION: Ms. Iris Davis  
Environmental Analyst

RECEIVED  
NOV 14 1986

Massachusetts Region

Gentlemen:

SUBJECT: Demolition - JFK/UMASS MBTA Modernization Project  
Contract S3CN07 - Hazardous Waste Remediation  
Dorchester, Massachusetts

On behalf of the Massachusetts Bay Transportation Authority (MBTA), we are forwarding herewith the following information as a follow-up to our conversation and a conversation with John Fitzgerald:

- o Hazardous Waste Report" dated July 11, 1986 by Sverdrup
- o Revet Environmental lab data - August 4, 1986
- o Site Inventory - August 8, 1986
- o Letter to MBTA from Sverdrup dated August 8, 1986
- o Revet Environmental lab data - September 12, 1986
- o Chemfix Technologies letter dated October 22, 1986
- o Chemfix Technologies letter dated November 11, 1986

The MBTA Station Modernization Project consists of the construction of a new station platform to provide access at the JFK/UMASS Station to both the Ashmont and Braintree Red Line trains. To complete this project, the MBTA obtained two parcels of land referred to as the Harry Butter Property and the UMASS Property and will be utilizing the existing Station Property; all as shown on Figure No. 1. A Property Assessment Report was completed for the MBTA on the Harry Butter Property, due to the past use of the property as a secondary brass and bronze producer.

The Station Modernization contract was advertised for bids on August 28, 1986 and bids were received on November 3, 1986. The demolition work and the remediation work associated with the Harry Butter Property was excluded from the Station Modernization Contract and will be issued as a separate construction contract; which must be completed by October 31, 1987, to allow the Station Modernization Contractor to complete his project within the contractual requirements.

Ms. Iris Davis  
Page 2  
November 14, 1986

Sverdrup Corporation, as consultant to the MBTA, is in the process of preparing the Remediation Plan for the cleanup of the Harry Butter Property. As part of the Remediation Plan we are recommending cleanup of the contaminated soil utilizing a chemical fixation process. The following is an outline of the major steps that will be incorporated into the plan:


- o Decontaminate superstructures
- o Demolish superstructures
- o Additional soil sampling and testing to determine profile of contaminated soil
- o Removal of concrete slabs and foundations after decontamination
- o Treatment of contaminated soil using a chemical fixation process with ultimate disposal of treated soil at a commercial landfill
- o Backfill and final grading of site

We anticipate that the Remediation Plan will be submitted to DEQE no later than December 22, 1986.

If you have any questions regarding this matter, do not hesitate to contact us.

Very truly yours,

SVERDRUP CORPORATION

  
James A. Pappas, P.E.  
Chief Environmental Engineer  
New England Division

JAP:ajf

cc: George H. Smith, Jr., MBTA  
Arnold L. Shorrock, Sverdrup Project Manager

# Chemfix Technologies, Inc.

in partnership with the environment®

October 22, 1986

Metairie Centre, Suite 620  
2424 Edenborn Avenue  
Metairie, Louisiana 70001  
(504) 831-3600

Mr. Jim Pappas  
✓ Sverdrup Corporation  
38 Chauncey Street  
Boston, Massachusetts 02111

Subject: Massachusetts Bay Transportation Authority  
Dorchester, Massachusetts  
Site mitigation, using the CHEMFIX® Process

Dear Mr. Pappas,

The test have been completed on the two samples of lead contaminated solids at the subject site.

The pile of solids expected to have the highest lead concentration showed a total lead content of over 7500 mg/kg. The pile expected to be considerably lower in lead content turned out to have an even higher concentration of lead in excess of 10,000 ppm.

The following table summarizes the analytical results. The remainder of the original samples and a quantity of the CHEMFIX® product is being shipped to you for your examination and disposal. The analytical work was performed by CTI's wholly owned laboratory subsidiary, Environmental Industrial Laboratory Associates, Inc. (EIRA).

TABLE

TEST RESULTS(1)

SAMPLE NAME	"AVERAGE"	"HIGH"
Total lead content-mg/kg	10,291	7,693
CTI Test Code	G	F
EP Extract- Lead content-mg/l(2)	3.24	3.35
EP - Toxicity Minimum Characteristic Lead level-mg/l (From Paragraph 261.24, Table I)	5.0	5.0

(1) - Test method for Evaluating Solid Waste Physical/Chemical Methods Waste Characterization Branch, EPA Revised, April 1984. Extraction Procedure: Method 1310 Lead; Method 344, page 166 Analytical methods According to Standard Methods for the Examination of Waste and Waste Water, American Public Health Association, 14 Edition, 1975

(2) - Test results on the CHEMFIX® Product extract

Page 2  
Mr. Jim Pappas  
Sverdrup Corporation

The results indicate a waste that is readily treated to achieve a product that easily meets the requirements for leachate quality. The CHEMFIX® process can be successfully used to render the wastes tested non-hazardous according to the Characteristic of EP toxicity.

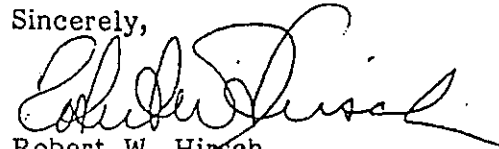
According to our conversations, the waste piles sampled at the MBTA site represent the most highly, contaminated waste on the site. The laboratory tests indicate these wastes are readily treatable with the CHEMFIX® process. It is therefore, reasonable to assume that all of the contaminated soil is treatable using the CHEMFIX® Process.

A proposal is being prepared to treat the estimated 5000 to 6000 cubic yards of contaminated soil. Art Buesing will be working with me as CTI's local representative as this project proceeds. Considering his background with both Chemical Waste Management and more recently with OH Materials, he may be able to provide resource information on appropriate contractors if Sverdrup wants to act as a general hazardous waste contractor and manage the cleanup. I suspect this approach could provide the lowest overall cost to the MBTA.

Art or myself will keep you posted on the status of the proposal and on the search for an appropriate commercial off site landfill.

If you have any comments or questions in the meantime, please call toll free 1-800-992-3443 or at 504-831-3600.

Sincerely,



Robert W. Hirsch  
Vice President of Sales

RWH/wjb

cc: Arthur Buesing, CTI  
Dave Parenten, CTI.

Enclosure: Invoice for work to date

**GOLDBERG-ZOINO & ASSOCIATES, INC.**  
Geotechnical-Geohydrological Consultants

The GEO Building  
320 Needham Street  
NEWTON UPPER FALLS, MA 02164  
617-969-0050

**LETTER OF TRANSMITTAL**

DATE	9/12/86	JOB NO.	G 3876.2 - C
ATTENTION	MR. JAMES PAPPAS		
RE	JFK/UMASS STA.		

TO SVERDRUP CORP.  
36 CHAUNCEY ST.  
BOSTON, MA 02111

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via \_\_\_\_\_ the following items.

- ☐ Shop drawings    ☐ Prints    ☐ Plans    ☐ Samples    ☐ Specifications  
☐ Copy of letter    ☐ Change order    ☐ \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1			RELET LAB DATA

THESE ARE TRANSMITTED as checked below:

- ☐ For approval    ☐ Approved as submitted    ☐ Resubmit \_\_\_\_\_ copies for approval  
☒ For your use    ☐ Approved as noted    ☐ Submit \_\_\_\_\_ copies for distribution  
☒ As requested    ☐ Returned for corrections    ☐ Return \_\_\_\_\_ corrected prints  
☐ For review and comment    ☐ \_\_\_\_\_  
☐ FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS \_\_\_\_\_  
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COPY TO \_\_\_\_\_

SIGNED:

*Jim Ennis*

7  
REVET ENVIRONMENTAL & ANALYTICAL LABORATORIES, INC.  
Seven Neponset Street  
Worcester, MA 01606  
(617) 853-9028

September 9, 1986

RE: REAL Account Number: 1086-10  
GZA Project Number: G 3876.1  
GZA PO Number: 14149

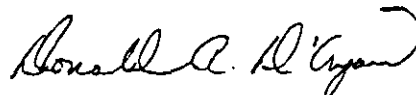
Dear Mr. Errico:

Attached is our report for the analysis of seven soils for bulk lead and EP Toxicity lead. Nothing unusual was encountered during this analysis.

The results were verbally reported on September 8, 1986.

If you have any questions, please call.

Sincerely,



Donald A. D'Anjou, Ph. D.  
Senior Chemist

Mr. James Errico  
Goldberg-Zoino & Associates, Inc.  
320 Needham Street  
Newton Upper Falls, MA 02164

Enclosures

DAD/cc

Lead EP Toxicity - Concentration mg/l

<u>GZA I.D. #</u>	<u>REAL I.D. #</u>	<u>CONCENTRATION</u>
SP-10; 0 - 1.5	R2342	< 0.04
SP-10; 1.5 - 2.	R2343	< 0.04
SP-12; 0 - 1.5	R2344	< 0.04
SP-12; 1.5 - 2.	R2345	< 0.04
SP-14; 0 - 1.5	R2346	< 0.04
SP-14; 1.5 - 1.7	R2347	< 0.04
SP-16; 0.5 - 2.5	R2348	< 0.04

Spike Recovery Percentage = 104

Bulk Pb - Concentration ug/g (dry weight)

<u>GZA I.D. #</u>	<u>REAL I.D. #</u>	<u>CONCENTRATION</u>
SP-10; 0 - 1.5	R2342	194
SP-10; 0 - 1.5	R2342 DUP.	185
SP-10; 1.5 - 2.	R2343	232
SP-12; 0 - 1.5	R2344	103
SP-12; 1.5 - 2.	R2345	112
SP-14; 0 - 1.5	R2346	79.9
SP-14; 1.5 - 1.7	R2347	< 6.0
SP-16' 0.5 - 2.5	R2348	715

Spike Recovery Percentage = 95.6

Analyst

  
 Donald A. D'Anjou, Ph.D.



1  
REAL Account Number: 1086-10  
GZA Project Number: G 3876.1  
GZA P.O. Number: 14149

NARRATIVE

Seven soil samples were received in good condition from Mr. J. O'Brien of GZA for bulk Pb and EP Toxicity Pb analysis. The methods used and the results are tabulated below.

Table 1

<u>Procedure</u>	<u>USEPA Method</u>
Digestion	4.1.4
EP Toxicity	1310
Pb	200.7

**Sverdrup**  
CORPORATION

38 Chauncy Street  
Boston, Massachusetts 02111

617 482-7880

August 8, 1986

Massachusetts Bay Transportation Authority  
South Station Project Office  
P. O. Box 1225, GMF  
Boston, MA 02205

ATTN: George Smith Jr., Project Manager

RE: JFK/UMASS MBTA Station Modernization - Contract No. 104-001  
Dorchester, Massachusetts

Gentlemen:

As indicated in our Preliminary Hazardous Waste Plan, we are forwarding herewith the results from the additional soil sample testing for the Butter Realty site and the UMASS property. A total of 18 tests were performed - 13 bulk lead and 5 EP Toxicity tests.

The test results indicate that the top 2 to 3 feet of soil on the Butter Realty site are hazardous waste. All three samples, SP-1, SP-4U and SP-6, failed the EP Toxicity procedure for metal; thereby the soil is classified as a hazardous waste. The test results of the soils from the UMASS property indicate high concentrations of lead, 30 ppm to 2900 ppm. However, the two sample that EP Toxicity was performed on, did not exceed the maximum limits and therefore, the soil is not classified a hazardous waste. A strict dust control program will be required during the construction, since the concentrations of lead are high enough that a health and safety concern for workers does exist.

We are continuing with the preparation of the final Mitigation Plan and will forward it as soon as it is available. We are awaiting your response to our letter of July 17, 1986, regarding performance of the demolition work on a time-and-materials basis.

If you have any questions, do not hesitate to contact me.

Very truly yours,

SVDRUP CORPORATION

  
A.L. Shorrock

ALS/cb

REVE ENVIRONMENTAL & ANALYTICAL LABORATORIES, INC.

1-290/190 Technology Park

7 Neponset Street

Worcester, MA 01606

(617) 853-9028

August 1, 1986

Mr. Ted Pickering  
Goldberg-Ziono & Associates, Inc.  
320 Needham Street  
Newton Upper Falls, MA 02164

RE:                REAL Account Number:    1076-07  
                  GZA Project Number:       G3876  
                  GZA PO Number:            13644

Dear Mr. Pickering:

Attached are the data for our analysis of 13 soils for bulk  
lead and 5 soils for EP toxicity metals.

If you have any questions, please call.

Sincerely,



Arthur E. Clark  
Chief Operating Officer

enclosures

REAL Account Number 1076-07  
 GZA Project Number: G 3876  
 GZA PO Number: 13644

### NARRATIVE

We received from Richard O'Brien of Ad Com Express the following samples: three soils for EP toxicity and 13 soils for bulk lead. On July 22, 1986, we were requested to do EP toxicity on two of the soils which were initially only for bulk lead.

The data are summarized in the following tables.

TABLE I  
Methods of Analysis

EP Toxicity	1310
Soil Digestion(bulk)	3050
Ag	200.7
Ba	200.7
Cd	200.7
Cr	200.7
Hg	245.1
Pb	200.7
Se	200.7
As	200.7

TABLE II  
Total Lead, [dry weight]

REAL Number	GZA Number	Lead (ug/g or ppm)
R2015	SP-1-S-2A	1120
R2016	SP-4-S-2	512
R2017	SP-5-S-2	542
R2017dup	SP-5-S-2	545
R2018	SP-6-S-2	1470
R2019	GZ-1-S-2	199
R2020	GZ-2-S-1	400
R2021	GZ-2-S-2	420
R2022	GZ-1-S-1	2950
R2023	SP-5-S-1	956
R2024	SP-7U-S-1	151
R2025	SP-7U-S-2	29.7
R2026	GZ-4-S-1	894
R2027	GZ-4-S-2	248
R2023	Z Recovery = 121% [nonhomogeneous]	

REAL Account Number: 1076-0/  
GZA Project Number: G 3876

TABLE III  
Toxicity Extraction Procedure for Metals [mg/l or ppm]

GZA ID	REAL ID	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
SP-1-S-1	R2012	0.223	1.35	0.161	K0.02	24.8	K0.0002	K0.06	K0.007
SP1-S-1dup	"	K0.1	1.08	0.172	K0.02	5.03	K0.0002	K0.06	K0.007
SP-4U-S-1	R2013	K0.1	1.59	0.164	K0.02	12.5	K0.0002	K0.06	K0.007
SP-6-S-1	R2014	K0.1	1.34	0.183	K0.12	15.1	K0.0002	K0.06	0.046
GZ-2-S-1	R2020	K0.1	K 1	K.01	K0.02	K 0.04	K0.0002	K0.06	K0.007
GZ-1-S-1	R2022	K0.1	K 1	K.01	K0.02	0.840	K0.0002	K0.06	K0.007

% Recovery

101	88.4	96.8	98.7	99.8	84	103	90.0
96.6	102	105	103		95	102	90.0

K = less than.

SVERDRUP & PARCEL AND ASSOCIATES, Inc.  
ENGINEERS - ARCHITECTS  
38 CHAUNCEY STREET  
BOSTON, MASSACHUSETTS 02111

TO: Department of Environmental  
Quality Engineering  
5 Commonwealth Avenue

DATE: 3-31-87

Woburn MA 01801

ATTN: Eric W Davis  
Environmental Analyst

JOB NO. 8730 PROJECT: NEK/UMASS Remediation Project

THE FOLLOWING IS TRANSMITTED

- ☒ HEREWITH.  
☐ UNDER SEPARATE COVER.  
☐ FOR YOUR USE OR DISTRIBUTION.  
☐ FOR REVIEW AND COMMENTS.  
☐ FOR CORRECTION AND RESUBMITTAL.

QUANTITY

DESCRIPTION

1 Additional Test Results

THIS TRANSMITTAL IS PER

- ☒ NORMAL PROCEDURE  
☐ YOUR LETTER  
☐ YOUR TELEGRAM  
☐ YOUR TELEPHONE REQUEST

DATED \_\_\_\_\_ FROM YOUR \_\_\_\_\_ TO OUR \_\_\_\_\_

REMARKS:

CC: George H. Smith Jr.  
MBTA

SVERDRUP & PARCEL AND ASSOCIATES, Inc.

BY James W. Pappas

TABLE 1

## H-NU SCREENING OF SOIL SAMPLES

<u>Boring Number</u>	<u>Depth (feet)</u>	<u>Total Volatile Organic Compounds(1)</u>
GZ-100	0.5-2.5	<1
	5-7	<1
	10-12	<1
GZ-101	0.5-2.5	<1
	5-7	60
	10-12	3
GZ-102	0-2	<1
	5-7	<1
	10-12	<1
GZ-6	0.5-2.5	8
	5-7	10

NOTE:

1. Total volatile organic compounds reported in parts per million as detected by an H-Nu Photoionization analyzer, Model PI-101.

RECEIVED  
FEB 27 1971  
D.E.Q.E.-Northeast Region

## pH-CONDUCTIVITY DATA SHEET

JOEL.No. G-3876.2

PROJECT MANAGER JVE

DATE/TIME IN: 2/19 / 87

SAMPLE TYPE:        SOIL, X WATER. TESTED BY JG DATE/TIME TESTED: 2/20 /87

pH METER: X ORION RESEARCH MODEL 701A/DIGITAL IONALYZER  
       OTHER; \_\_\_\_\_

COND. METER:        X   EXTECH MODEL 440 DIGITAL CONDUCTIVITY METER  
                                OTHER; \_\_\_\_\_

CONDUCTIVITY PROBE CELL CONSTANT 1.32, PROBE K 1.0

Is this really a water sample?

[illegible]



PAGE 1  
JOB #: 6-3876.2  
DATE SAMPLED: 2/17/87  
DATE TESTED: 2/27/87  
LABORATORY #: 10260

GOLDBERG-ZOINO ASSOCIATES  
320 NEEDHAM STREET  
NEWTON UPPER FALLS, MA 02164  
(617) 969-0050

GZA 601-602 ANALYSIS  
PURGABLE HALOCARBONS AND PURGABLE AROMATICS

SAMPLE # 62-101

COMPOUND	CONCENTRATION ug/l (PPB)	DETECTION LIMIT ug/l (PPB)	COMPOUND	CONCENTRATION ug/l (PPB)	DETECTION LIMIT ug/l (PPB)
601 COMPOUNDS:					
CHLOROMETHANE			1CIS-1,3-DICHLOROPROPENE		
METHANOL			1TRICHLOROETHYLENE		
BROMOMETHANE			1TRANS-1,3-DICHLOROPROPENE		
VINYL CHLORIDE			11,1,2-TRICHLOROETHANE		
DICHLOROFLOROMETHANE			1CHLORODIBROMOMETHANE		
CHLOROETHANE			12-CHLOROETHYL VINYL ETHER		
METHYLENE CHLORIDE			1BROMOFORM		
TRICHLOROFLOUROMETHANE			11,1,2,2-TETRACHLOROETHYLENE		
1,1-DICHLOROETHYLENE			11,1,2,2-TETRACHLOROETHANE		
BROMOCHLOROMETHANE					
1,1-DICHLOROETHANE			602 COMPOUNDS:		
TRANS-1,2-DICHLOROETHYLENE					
CHLOROFORM			1BENZENE	ND	1ug/l
1,2-DICHLOROETHANE			1TOLUENE	ND	1ug/l
1,1,1-TRICHLOROETHANE			11,2-DICHLOROBENZENE	ND	1ug/l
CARBON TETRACHLORIDE			11,3-DICHLOROBENZENE	ND	1ug/l
BROMODICHLOROMETHANE			11,4-DICHLOROBENZENE	ND	1ug/l
1,2-DICHLOROPROPANE			1CHLOROBENZENE	ND	1ug/l
			1ETHYLBENZENE	ND	1ug/l

COMMENTS: These results represent a tentative screening of this sample according to EPA Protocol 602 method.  
This screening was not performed by a DEQE certified facility.  
ND signifies none detected above the method detection limit.

ANALYZED BY: JSM  
REVIEWED BY: EUP

TABLE 2  
GZA GC ANALYSIS FOR VOLATILE ORGANIC COMPOUNDS  
PEAK HEIGHT

Sample Number	62A-100	62A-101	62A-102	INSIDE TANK	INSIDE TROUGH	OUTSIDE TROUGH	GZ-101	GZ-6	
UQ Lab ID Number	05463	05464	05465	05466	05467	06613	06614	06615	Tentative ID
	GW	GW	GW	SW	SW	SW	GW	GW	
Relative Retention Times	2.9%	>100	>100	>100	-	1.2	-	>100	>100
	20.0%	-	0.1	-	-	-	-	-	METHANE
	25.7%	-	TRACE	-	-	-	-	-	UNKNOWN

Toluene Absolute Retention Time: 3.50

1. Volatile organic compounds were screened with a Century Systems Model OVA-128 Flame Ionization Detector Gas Chromatograph employing headspace techniques adapted from Clay and Spittler, "The Use of Portable Instruments in Hazardous Waste Site Characterizations" 1982. The column is a 1-12 packed with 10% 1,2,3 TRIS propane on 60/80 mesh chromosorb P, RJ.

2. Compound retention times are measured as percentages of the toluene retention time, (toluene's absolute retention time is approx. 5 min. at 24 C and 1 atm). Peak heights are measured in inches, and peak areas are calculated as peak height times the width at half height. These represent relative quantities, and must not be confused with actual concentration reportage.

3. A tentative compound identification has been made by comparison to standards of pure compounds in water. To confirm compound identifications a GC/MS is recommended.

TABLE 3

## RESULTS OF GZA SCREENING ANALYSES OF WATER SAMPLES

<u>Sample Location</u>	<u>pH</u>	<u>Specific Conductance umhos/cm at 20 to 25°C)</u>
GZ-6	9.05	1022
GZ-100	6.48	1960
GZ-101	6.88	1700
GZ-102	7.27	771
"inside" trough	10.80	393
"outside" trough	10.98	441
water tank pit	7.10	138

NOTES:

1. pH measured with an Orion Research digital ionanalyzer.
2. Conductivity measured with an Extech digital conductivity meter.



[illegible]

GOLDBERG-ZOINO & ASSOCIATES, INC. GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS	PROJECT JFK/11 Mass Station Dorchester, MA	REPORT OF BORING NUMBER GZ-102
	SHEET DATE 4/22/86	OF FILE G-3876.1

BORING CO. GZA Drilling Co., Inc.	BORING LOCATION See Plan
FOREMAN F. Perry	GROUND ELEV. 116.57 (MBTA DATUM)
GZA ENGINEER M. Stoughton/dkr	DATE STARTED 4/22/86 DATE ENDED 4/22/86

CASING		SAMPLER		GROUNDWATER READINGS	
SIZE: 3-3/4" ID Hollow Stem Auger	TYPE: Split Spoon 24"	OTHER:	DATE	DEPTH	CASING AT
HAMMER: lb	HAMMER: 140 lb		4/22	10.0'	OW
FALL:	FALL: 30		5/6	9.4'	OW
					14 DAYS

DEPTH	CAS. BL. / FT.	SAMPLE				SAMPLE DESCRIPTION	START CHG. GEN. DESC.	EQUIPMENT INSTALLED	FIELD TESTING	RMKS.
		NO.	PEN./REC.	DEPTH	BLOWS/6"					
		S-1	24/10	0-2	10-15	Medium dense, light and dark brown, fine to medium SAND, little gravel, trace Silt.				
					12-13				0.2	
5		S-2	24/8	5-7	1-2	Loose, gray and brown, fine to medium SAND, little Silt.	GRANULAR FILL	Antontite Seal 2'-3'		
					2-2				0.2	
10		S-3	24/24	10-12	1-2	Soft, dark brown, fibrous PEAT.	10' PEAT	1 1/2" PVC Screen 10'-15'		
					2-2				0.3	
15		S-4	18/6	15.5-17	20-41	Very dense, dark brown, fine to medium SAND, little Silt.	14' SAND			
					55					
20						Bottom of boring at 17.0'.				

REMARKS: 1. Refer to note 1 on boring log GZ-100.

NOTES: 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORINGS LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO FACTORS NOT ACCOUNTED FOR AT THE TIME MEASUREMENTS WERE MADE

GOLDBERG-ZOINO & ASSOCIATES, INC.  
320 NEEDHAM ST., NEWTON UPPER FALLS, MA.

GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT

JFK/U MASS STATION  
DORCHESTER, MA

REPORT OF BORING No. GZ-6

SHEET 1 OF 3

FILE No. G-3876

CHKD. BY

BORING Co. GZA Drilling Inc.

FOREMAN F. Perry

GZA ENGINEER M. Stoughton

BORING LOCATION See plan.

GROUND SURFACE ELEVATION 116.06 DATUM MBTA

DATE START 5/9/86 DATE END 5/6/86

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140lb HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300lb. HAMMER FALLING 24 in.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
5/6	10:30	10.1	WELL	1/2 HOUR

CASING SIZE: 4" I.D.

OTHER:

DEPTH (ft)	CASING (b/f/h)	SAMPLE				SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
		No.	PEN. (in) REC.	DEPTH (ft)	BLOWS/6"			
5		S-1	24/5	0.5-2.5	12-15	Medium dense, dark grey, fine to coarse SAND, some Silt.		GRANULAR FILL
					10-19			
10		S-2	24/11	5-7	7-5	Medium dense, dark grey fine to medium SAND, some (-) Silt.		FIBROUS PEAT
					11-9			
15		S-3	24/18	10-12	1-1	Soft, brown fibrous PEAT, little Sand grading into Medium dense, brown fine to medium SAND, some (-) Silt, strong gasoline odor.		FINE SAND
					5-9			
20		S-4	24/10	15-17	9-14	Dense, light brown fine SAND, little Silt, grading into yellow SILTY CLAY.		STIFF TO MEDIUM STIFF SILTY CLAY
					16-11			
25		S-5	24/24	20-22	3-4	Stiff, grey SILTY CLAY.		
					5-6			
30		S-6	24/20	25-27	3-3	Medium stiff, grey SILTY CLAY.		
					4-4			
35		S-7	24/24	30-32	2-2	Medium stiff, grey SILTY CLAY.		
					4-4			

GRANULAR SOILS		COHESIVE SOILS	
BLOWS/FT.	DENSITY	BLOWS/FT.	DENSITY
0-4	V. LOOSE	< 2	V. SOFT
4-10	LOOSE	2-4	SOFT
10-30	M. DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	V. DENSE	15-30	V. STIFF
		>30	HARD

REMARKS:

- Monitoring well installed using a 5' x 1 1/2" PVC screen from 10 to 15 feet and 1 1/2" PVC riser pipe from 10 feet to approximately 2' above the ground surface. A 1" bentonite seal was placed at 3' below the ground surface and a locking vented protective casing was installed. Stickup 24'.



NOTES: 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.

2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING No. GZ-6

GOLDBERG-ZOINO & ASSOCIATES  
320 NEEDHAM ST, NEWTON UPPER FALLS, MA.

GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT

JFK/U MASS STATION  
DORCHESTER, MA

REPORT OF BORING No. GZ-6

SHEET 2 OF 3

FILE No. G-3876

CHKD. BY

DEPTH (ft)	CASING (b/i/i)	SAMPLE				SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
		No.	PEN. (in)/REC	DEPTH (ft)	BLOWS/6"			
35		S-8	24/22	35-37	1-2 4-4	Medium stiff, grey SILTY CLAY.		MEDIUM STIFF SILTY CLAY
40		S-9	24/24	40-42	1-2 3-5	Medium stiff, grey SILTY CLAY.		
45		S-10	24/24	45-47	1-1 3-3	Medium stiff, grey SILTY CLAY.		
50		S-11	24/20	50-52	1-3 3-4	Medium stiff, grey SILTY CLAY.		
55		S-12	24/24	55-57	1-2 3-3	Medium stiff, grey SILTY CLAY.		
60		S-13	24/20	60-62	1-1 3-4	Medium stiff, grey SILTY CLAY.		
65		S-14	24/20	65-67	5-5 4-4	Stiff, grey SILTY CLAY.		
70		S-15	24/18	70-72	WOR/3 4-5	Medium stiff, grey SILTY CLAY.		

REMARKS:



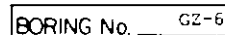
BORING No. GZ-6



GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

JFK/U MASS STATION  
DORCHESTER, MA

CHKD. BY \_\_\_\_\_

REMARKS:

August 8, 1986  
File No. G-3876.1-C,PC

BUTTER SITE INVENTORY

<u>Item No.</u>	<u>Description</u>
1.	One 55-gallon drum: empty
2.	Less than 1 cubic yard black sandy fine material along concrete berm located beneath fence
3.	Filler pipe beneath metal plate located on concrete pad
4.	Two fuel pumps and two vent pipes
5.	Two 55-gallon drums: filled with trash
6.	One 55-gallon drum: feels empty not opened
7.	One 55-gallon drum: full with what appears to be floor sweepings
8.	One 55-gallon drum: approximately 5 inches of liquid with slight petroleum hydrocarbon odor
9.	One Empty drum: in vicinity of drums 6-9 observed wood pallets & scrap metal.
10.	One 55-gallon drum: approximately 10 inches of what appears to be gray dust (floor sweepings?)
11.	Three 55-gallon drums: empty
12.	One 20-gallon(+) drum: miscellaneous trash and gray dust
13.	Eight 55-gallon drums: empty, corroded
14.	Two 55-gallon drums: 1/4 full with trash, gray dust (floor sweepings?)
15.	One metal bin (1/2 of old tank) and gray blocks (average size 4" x 4" x 4")
16.	One 30-gallon(+) drum: 1/2 full with trash, dust, burned material
17.	Approximately 2 cubic feet of black, fine, sandy material
18.	Appears to be a base plate for a scale



19. One 55-gallon drum full with liquid (appears rusty) drum uncovered liquid appears to be rainwater, drum labeled INSTAPAK - urethane foam resin
20. Four 55-gallon drums: empty  
Two smaller drums: empty
21. One 55-gallon drum labelled The state Chemical Manufacturing Co., feels empty, lid was not taken off
22. One 30-gallon(+) drum, open, 1/2 full with a liquid at top, 1/2 full with soft, solid odorous
23. One 55-gallon drum, feels full, white powder on top of lid
24. One 55-gallon drum feels full, labeled J.T. Baker, Methanol
25. One 30-gallon(+) drum, open, approximately 1/4 full with liquid and trash
26. One 55-gallon drum, 1/2 full with trash
27. One empty 30-gallon drum
28. One 30-gallon(+) drum on side, 1/2 full, appears to be miscellaneous, fine particles
29. One empty 55-gallon drum
30. Two 55-gallon drums; 3/4 full with grayish-white solid, brittle
31. One 55-gallon drum 1/2 full with trash
32. One empty 55-gallon drum
33. Scrap metal (2 cut off tanks)
34. Two 55-gallon drums, 1/2 full with trash
35. One 55-gallon drum, 1/2 full with trash and dust (floor sweepings?)
36. One 55-gallon drum, 1/2 full with liquid & trash, open (liquid appears to be rainwater)
37. Scrap metal in the form of 10 old tanks (home fuel oil tanks?)
38. Base plate for scale

39. One old 55-gallon drum
40. Miscellaneous cardboard container, approximately 10- to 20-gallon capacity, full with "cemented solid"
41. Rooms, not viewed
42. One cardboard, 55-gallon drum full with miscellaneous 1/2 cylindrical foam pads?
43. Three 55-gallon drums 1/4 - 1/2 full with miscellaneous solids (powdery & gritty)
44. One cardboard, 55-gallon drum, labeled bone ash
45. Two empty 5-gallon pails
46. One bag of high alumina
47. One foam bag of what appears to be high alumina
48. One bag of charcoal
49. Scrap metal, one 55-gallon drum full with scrap metal
50. Metal bin with miscellaneous debris & desk
51. Metal bin with blocks, dust, fines, and slag
52. Four metal bins, same as above
53. Seven 55-gallon drums, empty
54. Metal plate in floor, approximately 3' x 3', could not lift
55. One 55-gallon drum, full of gray sandy material
56. One 55-gallon drum 1/2 full of gray sandy material
57. Trough from outside, pit in corner in floor with metal grate, back fine material (no more than 1 cubic yard) on floor in corner, same material at bottom of pit, pit depth approximately 1 foot, dry
58. Sludge appears to litter slab along with trash, empty drums blocks, gray fines etc. approximately 3 cubic yards
59. Scrap metal

- 60. Block and slag strewn in corner
- 61. Black fine material along fence and next to concrete bin approximately 6 cubic yards
- 62. Estimate volume height = 5 feet
- 63. Ten full metal bins approximately 4.5' x 2' x 3'
- 64. One 55-gallon drum, 1/5 full with dust (sweeping?)
- 65. Tank location
- 66. Seven empty 55-gallon drums
- 67. Furnace
- 68. Possible tank location, filler pipe?
- 69. Six holes in concrete to concrete holding tank

Note: See attached sketch for approximate location of above items.

- Groundwater
- Oil & Grease
- Drinking Water Metals, Zinc, Copper
- G.C. G-101, Volatile Organic Compounds
- Drinking Water Metals, Zinc, Copper
- Soil (fill)

• OIL & GAS

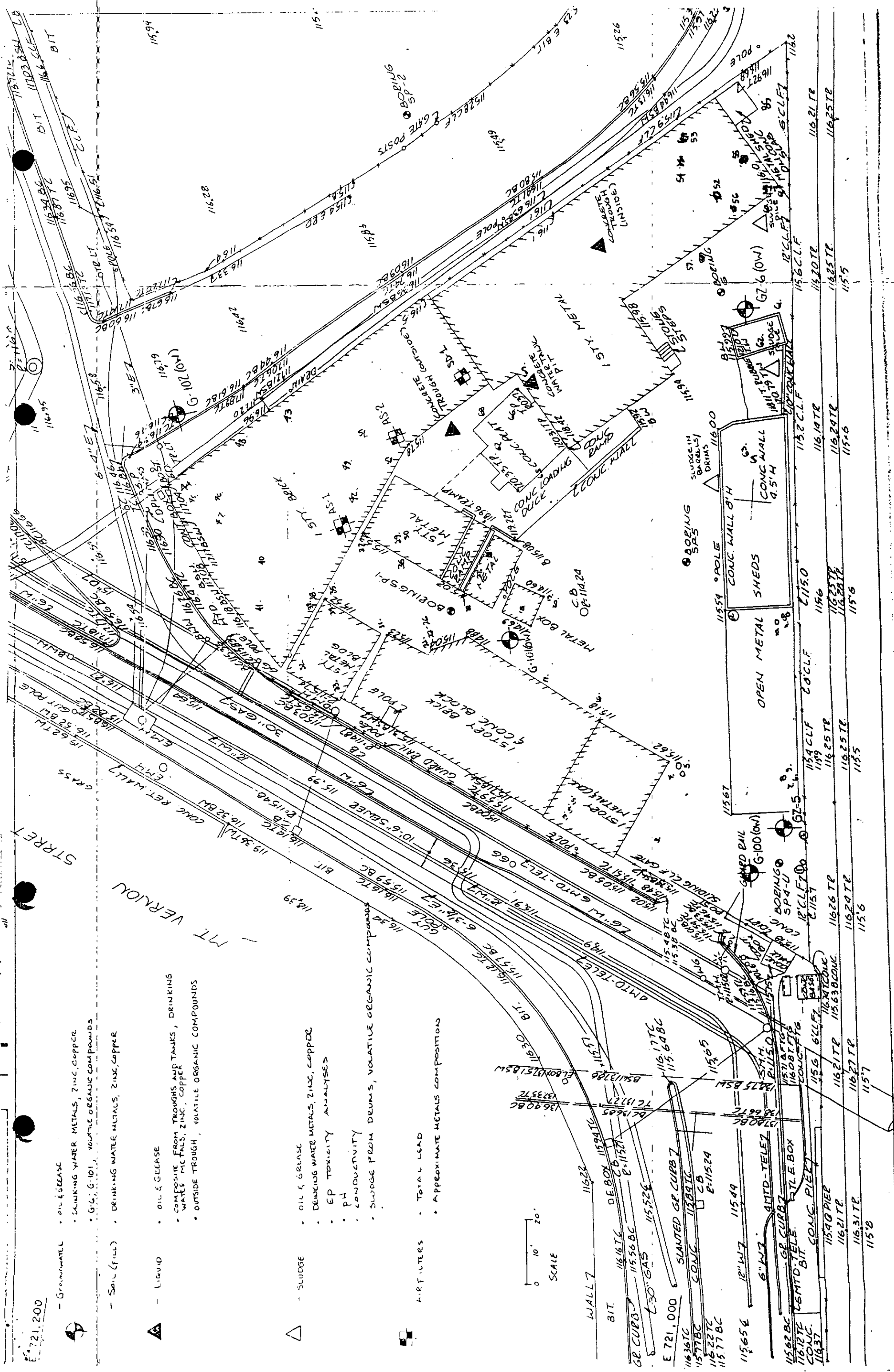
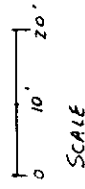
- OIL & GREASE
- COMPOSITE FROM TROUGHS AND TANKS, DRINKING WATER METALS, ZINC, COPPER
- OUTSIDE TROUGH VOLATILE ORGANIC COMPOUNDS

350175 -

- OIL & GREASE
- DRINKING WATER METALS, ZINC, COPPER
- EP TOXICITY ANALYSES
- pH
- CONDUCTIVITY
- SWOGE FROM DRUMS, VOLATILES

LETTERS

- TOTAL LEAD
- APPROXIMATE METALS COMPOSITION



**GOLDBERG-ZOINO & ASSOCIATES, INC.**  
Geotechnical-Geohydrological Consultants

The GEO Building  
320 Needham Street  
NEWTON UPPER FALLS, MA 02164  
617-969-0050

**LETTER OF TRANSMITTAL**

DATE <i>August 4, 1986</i>	JOB NO <i>G3876.1</i>
ATTENTION <i>MR. James Pappas</i>	
<i>Butter Realty Site</i>	
<i>Dorchester, Ma</i>	

TO *Sverdrup & Parcel Associates, Inc*  
*38 Chauncy Street*  
*Boston, MA 02111*

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via \_\_\_\_\_ the following items.

Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

Copy of letter ☐ Change order ☐ \_\_\_\_\_

COPIES	DATE	NO	DESCRIPTION
<i>1</i>	<i>1 Aug 1986</i>		<i>REAL data for analysis of 13 soils for bulk lead and 5 soils for EP toxicity metals</i>

THESE ARE TRANSMITTED as checked below:

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> For approval  | <input type="checkbox"/> Approved as submitted    | <input type="checkbox"/> Resubmit _____ copies for approval   |
| <input checked="" type="checkbox"/> For your use   | <input type="checkbox"/> Approved as noted        | <input type="checkbox"/> Submit _____ copies for distribution |
| <input checked="" type="checkbox"/> As requested   | <input type="checkbox"/> Returned for corrections | <input type="checkbox"/> Return _____ corrected prints        |
| <input type="checkbox"/> For review and comment  | <input type="checkbox"/> _____                    |   |
| <input type="checkbox"/> FOR BIDS DUE _____ 19 _____ <input type="checkbox"/> PRINTS RETURNED AFTER LOAN TO US |   |   |

REMARKS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

COPY TO \_\_\_\_\_

SIGNED: *Kim Jaworski-Bruschi*

If enclosures are not as noted, kindly notify us at once.

REVET ENVIRONMENTAL & ANALYTICAL LABORATORIES, INC.  
1-290/190 Technology Park  
7 Neponset Street  
Worcester, MA 01606  
(617) 853-9028

August 1, 1986

Mr. Ted Pickering  
Goldberg-Ziono & Associates, Inc.  
320 Needham Street  
Newton Upper Falls, MA 02164

RE: REAL Account Number: 1076-07  
GZA Project Number: G3876  
GZA PO Number: 13644

Dear Mr. Pickering:

Attached are the data for our analysis of 13 soils for bulk lead and 5 soils for EP toxicity metals.

If you have any questions, please call.

Sincerely,



Arthur E. Clark  
Chief Operating Officer

enclosures



REAL Account Number 1076-07  
 GZA Project Number: G 3876  
 GZA PO Number: 13644

# NARRATIVE

We received from Richard O'Brien of Ad Com Express the following samples: three soils for EP toxicity and 13 soils for bulk lead. On July 22, 1986, we were requested to do EP toxicity on two of the soils which were initially only for bulk lead.

The data are summarized in the following tables.

TABLE I  
Methods of Analysis

EP Toxicity	1310
Soil Digestion(bulk)	3050
Ag	200.7
Ba	200.7
Cd	200.7
Cr	200.7
Hg	245.1
Pb	200.7
Se	200.7
As	200.7

TABLE II  
Total Lead, [dry weight]

REAL Number	GZA Number	Lead (ug/g or ppm)
R2015	SP-1-S-2A	1120 B
R2016	SP-4U-S-2	512 B
R2017	SP-5-S-2	542 B
R2017dup	SP-5-S-2	545 B
R2018	SP-6-S-2	1470 B
R2019	GZ-1-S-2	199 u
R2020	GZ-2-S-1	400 u
R2021	GZ-2-S-2	420 u
R2022	GZ-1-S-1	2950 u
R2023	SP-5-S-1	956 B
R2024	SP-7U-S-1	151 u
R2025	SP-7U-S-2	29.7 u
R2026	GZ-4-S-1	894 u
R2027	GZ-4-S-2	248 u
R2023	% Recovery = 121% [nonhomogeneous]	

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TABLE III  
Toxicity Extraction Procedure for Metals [mg/l or ppm]

GZA ID	REAL ID	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
<i>failed</i> SP-1-S-1	R2012	0.223	1.35	0.161	K0.02	24.8	K0.0002	K0.06	K0.007
SP1-S-1dup	"	K0.1	1.08	0.172	K0.02	5.03	K0.0002	K0.06	K0.007
<i>failed</i> SP-4U-S-1	R2013	K0.1	1.59	0.164	K0.02	12.5	K0.0002	K0.06	K0.007
<i>failed</i> SP-6-S-1	R2014	K0.1	1.34	0.183	K0.12	15.1	K0.0002	K0.06	0.046
GZ-2-S-1	R2020	K0.1	K 1	K.01	K0.02	K 0.04	K0.0002	K0.06	K0.007
GZ-1-S-1	R2022	K0.1	K 1	K.01	K0.02	0.840	K0.0002	K0.06	K0.007
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% Recovery		101	88.4	96.8	98.7	99.8	84	103	90.0
		96.6	102	105	103		95	102	90.0

K = less than.

- Groundwater
  - oil & grease
  - drinking water metals, zinc, copper
  - G.C, G-101, volatile organic compounds
- Soil (fill)
  - drinking water metals, zinc, copper
- Liquid
  - oil & grease
  - composite from troughs and tanks, drinking water metals, zinc, copper
  - outside trough volatile organic compounds

- SLUDGE
- OIL & GREASE
- DRINKING WATER METALS, ZINC, COPPER
- EP TOXICITY ANALYSES
- pH
- CONDUCTIVITY
- SLUDGE FROM DRUMS, VOLATILE

AIR FILTERS

TOTAL LEAD

APPROXIMATE METALS COMPOSITIONS

